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ABSTRACT

Volume II of a three-volume report on the availability of primary scientific and technical documents within the U.S. presents the detailed methodology and findings of the study. The design is presented under nine headings: (1) literature survey, (2) data-base design, (3) establishing data collection points, (4) review of objectives and statement of questions, (5) data collection, (6) design of reports for data analysis, (7) systems design and programming, (8) data conversion and file building, and (9) data analysis and report preparation. Conclusions are presented on availability of scientific and technical serials and conference proceedings volumes, interlibrary loan effectiveness, the need for document back-up resources, and applicability of the results of this review. Volume I (LI 002 454) contains a summary of the objectives and results of the study, and Volume III (LI 002 456) contains the bibliography and appendixes. (AB)

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FINAL REPORT

Project No. 7-0930
Contract No. OEC-1-7-070930-5145

A REVIEW OF THE AVAILABILITY OF PRIMARY SCIENTIFIC AND TECHNICAL DOCUMENTS WITHIN THE UNITED STATES

VOLUME II

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Chemical Abstracts Service
The Ohio State University

Columbus, Ohio 43210

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FOREWORD

This is Volume II of a three-volume report on the availability of primary scientific and technical documents within the United States. The important results and the recommendations are reviewed in Volume I, while this volume presents the detailed methodology and findings of the study. Volume III contains the bibliography and appendixes for the study and are the repository for supportive documents that back up the material presented in this volume.

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CAS also wishes to acknowledge the important contribution to the definition of this project and the carrying out of the work provided by the following committee of consultants:

Mr. Robert C. Krupp, Chief, Science and Technology Division,
New York Public Library

Mr. John P. McGowan, Associate University Librarian,
Northwestern University

Dr. Jerrold Orne, Director of Libraries,
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Dr. Maurice F. Tauber, Professor, Columbia University
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Dr. Theodore C. Hines, Professor, Columbia University
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Dr. Albert B. Bishop, Professor, The Ohio State University
Department of Industrial Engineering

This review was made economically feasible because of the existence in machine-readable form of a data base containing up-to-date bibliographic and library holdings information for scientific and technical documents. This data base was the CAS Library Support System's computer-based files used to produce the CAS publication ACCESS; these files were available at no cost to the Contract. The ACCESS data base, which was built through the generous support of 325 libraries in the United States and 72 in other countries, provided the core of material that became one of the three major data bases required for the study.

The participation in the project by nineteen of the major resource libraries in the United States is also acknowledged with sincere appreciation. Because these libraries were guaranteed anonymity, they cannot be identified. Nevertheless, the project would not have been possible without the full interest, cooperation, and support of the directors of these institutions.

The actual tasks associated with executing the review were performed by the CAS Library staff with assistance from CAS' Systems Development, Composition Services, and Data Processing Operations Departments. The dedication of these CAS staff members is also acknowledged.

James L. Wood
Project Director

BACKGROUND

The study reported on here was addressed to the broad question of whether scientists and engineers in the United States have access to the scientific and technical periodicals and conference proceedings that they need in their work. Scientists must depend upon the written record of past investigations and accomplishments in order to determine the thrust of new research; hence, the literature of science plays a fundamental role in scientific and technical advancement. Perhaps nowhere is this statement more applicable than it is in the fields of chemistry and chemical engineering, where the literature has a long and useful life and serves as a continuing base of reference for current work. To the extent that chemists, chemical engineers, and others working in related fields are denied access to the literature, technological progress is impeded.

The American Chemical Society, chartered by the U. S. Congress as a scientific and educational organization, and charged with a mission "to advance chemistry in all its branches," has since 1907 sought to improve access to the literature of chemistry and chemical engineering by publishing abstracts, indexes, and other informative guides to the literature. The large bulk of this work has been the responsibility of the Society's Chemical Abstracts Service (CAS), with headquarters in Columbus, Ohio.

A fundamental axiom of the ACS and of many other publishers of scientific abstracts and indexes is that these derivative routes of access to the literature are not substitutes for the original documents. That is, the abstracts and indexes are tools by which the working scientist can determine whether a given primary source document is likely to contain information of interest to him. Clearly then, the complement to the intellectual access provided by such services as those of Chemical Abstracts Service is a physical access to the literature provided to the scientists and engineers by local libraries.

For many years CAS has cooperated with the library community in publishing a list of periodicals abstracted with a key to the holdings of major resource libraries of the documents.(1) In the past, CAS has also worked to make its literature collection, which was assembled for purposes of abstracting and indexing, available in the library community after CAS had finished its analysis.

When CAS compiled its 1961 *List of Periodicals Abstracted in Chemical Abstracts*,(2) the library holdings information was recorded on punched cards and briefly analyzed. This analysis gave cause to doubt that sufficient documents were available in enough locations to satisfy the needs of the scientific and technical community. (This brief analysis is described in Appendix 1.) The 1965 findings of Fava and Hoshorsky reporting on deficiences in the availability of scientific journals in defense-oriented libraries(3) reinforced CAS' concern.

There were no funds available in 1961 to conduct a deeper analysis, (nor, in fact, were the data in appropriate form for such an analysis). Nevertheless, the preliminary findings reported in Appendix 1 took on added significance in 1965, when the federal government's Committee on Scientific and Technical Information (COSATI) recommended that at least one copy of every substantive technical document be available within the United States(4). Keeping in mind this recommendation and the results of the brief analysis of the 1961 data, the American Chemical Society determined to seek funds for an analysis of the availability of scientific and technical documents within the United States. The determination to proceed with this analysis was strengthened by two facts: (1) the compilation of a new and comprehensive list of periodicals to be called ACCESS would be undertaken by the American Chemical Society and the U. S. Library Community, out of their own resources, thus making available at no cost a data base that required millions of dollars to create, and (2) the data for ACCESS were to be created in machine-readable form thus making it possible for computers to aid with the extensive statistical analysis required for the project.

The proposed study was funded in July 1967 by the U. S. Office of Education (USOE) through its Library and Information Science Research Branch. As funded, the study had four major objectives:

1. To determine, for the United States as a whole and for selected geographic regions within the United States, what portion of already identified chemical and chemical engineering serials and conference proceedings documents are available in the collections of major resource libraries.

2. To study the effectiveness of interlibrary borrowing and facsimile procurement in supplying users with documents not available to them in original form from their local libraries.

3. To ascertain whether users' requests for source documents could better be satisfied if the CAS library collection were accessible as a backup resource service for libraries in meeting requests received by them.

4. To determine the applicability of this study to the serial literature of other fields of science and technology.

The list of chemical and chemical engineering serials and conference proceedings documents compiled by CAS consisted of holdings data collected from some 325 libraries which had participated in the ACCESS project. In order to satisfy the first purpose of determining the pattern of availability of source documents within the United States, these holdings were examined to determine the presence or absence of titles in the libraries' collections and to discover the extent of holdings of both current and back issues. This phase of the study provided data concerning documents available for on-the-spot use by the libraries' clientele and those available for fulfilling interlibrary loan requests or orders for photocopies or microforms.

Interlibrary loan studies were based on samples of data supplied by 19 major United States resource libraries. These data identified the serials and congress proceedings volumes that were needed by persons in some 3363 U. S. organizations (Appendix 28) but that were not available from their local libraries.

The CAS library collection has not previously been made available to the public on a current basis, but has been distributed instead to selected libraries at the end of the five- or ten-year periods corresponding with the end of CA indexing periods. Moreover, the collection has not been made publicly available as a single unit, but has been scattered at many libraries throughout the country.

In order to determine the applicability of the study to the serial literature of other fields of science and technology, the CAS staff compared the overlap of journals covered by CA (and therefore included in ACCESS) with those covered by other secondary services and noted the significant differences between the availability of the core literature of chemistry and chemical engineering and that of other disciplines.

DESIGN AND METHODS OF APPROACH

The overall design and methodology for this study can be presented under eight headings:

1. Literature Survey
2. Data-Base Design
3. Establishing Data Collection Points
4. Review of Objectives and Statement of Questions
5. Data Collection
6. Design of Reports for Data Analysis
7. Systems Design and Programming
8. Data Conversion and File Building
9. Data Analysis and Report Preparation

Literature Survey

The objectives of this phase of the project were to identify and evaluate published literature pertinent to the work of this study and to acquire the documents that contained needed data.

The principal sources of the documents collected as back-up for the study were the files of the CAS library and the information-science report and periodical literature. Among others, the following secondary sources were routinely scanned:

Library Literature(5)

Library Science Abstracts(6)

Documentation Abstracts(7)

Research in Education(8)

U. S. Government Research and Development Reports(9)

Technical Abstracts Bulletin(10)

Numerous primary journals were perused, personal contacts were made to obtain advanced copies of reports, and existing bibliographies were acquired and reviewed. Of special interest were the bibliographies prepared by Davis and Bailey(11) and Pritchard.(12)

A complete bibliography of the documents reviewed by the contract staff is included in Volume III of this report.

Data-Base Design

To meet the four objectives of this study required the examination of data from several sources. The following required data were organized, recorded, and filed:

1. Information gathered for the ACCESS project

2. Data on interlibrary loans for scientific and technical documents

3. Information about the holdings of the CAS Library

4. Lists of serials important to disciplines other than chemistry and chemical engineering.

1. The ACCESS Data Base -- The file of information gathered to produce ACCESS was created by CAS independently of the study reported here* and represented data on the holdings of some 325 libraries in the United States, as well as the holdings for many foreign libraries. Upon its completion in August 1969, the initial ACCESS data base contained 10,400 entries for currently published scientific and technical serials. Each entry consisted of a full bibliographic description of the serial, as well as the library holdings information. This data base provided a 40% sample of the total population of currently published scientific and technical serials according to Barr's(13) estimate of 26.000, or 30% according to the 35,000 ± 10% identified in the study conducted by Gottschalk and Desmond(14) at the Library of Congress. ACCESS also contained entries for over 6000 serial titles no longer being published, and 4500 non-serial publications consisting mostly of conference, congress, and symposium proceedings, all of which are considered to be primary source documents. This study was not extended to the patent literature that was also included in ACCESS, nor to books, technical reports, or dissertations.

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* Appendix 2 describes the ACCESS project.

The ACCESS data base was in computer-readable form, and was developed according to CAS standards for creating information files, including the CAS Standard File Format (Appendix 3). This format identifies and locates each element of data within a file, thus facilitating access to the information in the file and simplifying the development of programs to manipulate the data.

Within the ACCESS data base were the data required to determine holdings and gaps in holdings of the documents listed within the United States and within geographic regions of the United States. Thus, analysis of this data base could answer the question of whether or not documents important to chemistry and chemical engineering physically existed in the collections of one or more of the 325 libraries that participated in ACCESS.

2. The Interlibrary Loan Data Base -- Although analysis of the ACCESS data base would reveal which documents physically existed in library collections throughout the country, it would not reveal whether these documents were in fact "available" through local libraries nor whether the titles listed in ACCESS truly represented those requested by clientele of the libraries. To answer these questions required data on the traffic in interlibrary loans throughout the country.

Selection of data for the Interlibrary Loan data base was done by a sampling technique developed with the guidance of a professional statistician, Dr. Albert Bishop. The sample was to be drawn nationwide from libraries located in the nine U. S. Office of Education regions, and was to be obtained from each of the source libraries in two parts. The first part consisted of a minimum of 10% of the records each library had kept on its past year's interlibrary loan activities in scientific and technical serials and conference proceedings volumes. The second sample, limited to 500 transactions from each library, was drawn from current activity over an eight- to ten-week period. Dr. Bishop's calculations of these sample sizes are attached as Appendix 4.

3. The CAS Serials Collection -- To determine whether there was need for a backup resource for serials and conference proceedings volumes in chemistry and chemical engineering, CAS planned to compare the unfilled interlibrary loan requests and those filled only after a long wait with the documents available in the CAS Library. This collection dates from 1956 and represents 80% to 90% of the more than two million scientific papers abstracted by CAS since 1956. For convenience in making comparisons, these data were entered into the Applicability File (below).

4. The Applicability File -- To help the contract staff project the applicability of the results of this study to other scientific and technical disciplines, CAS created an "Applicability File" of titles of journals identified as important to disciplines other than chemistry and chemical engineering or to science and technology as a whole.

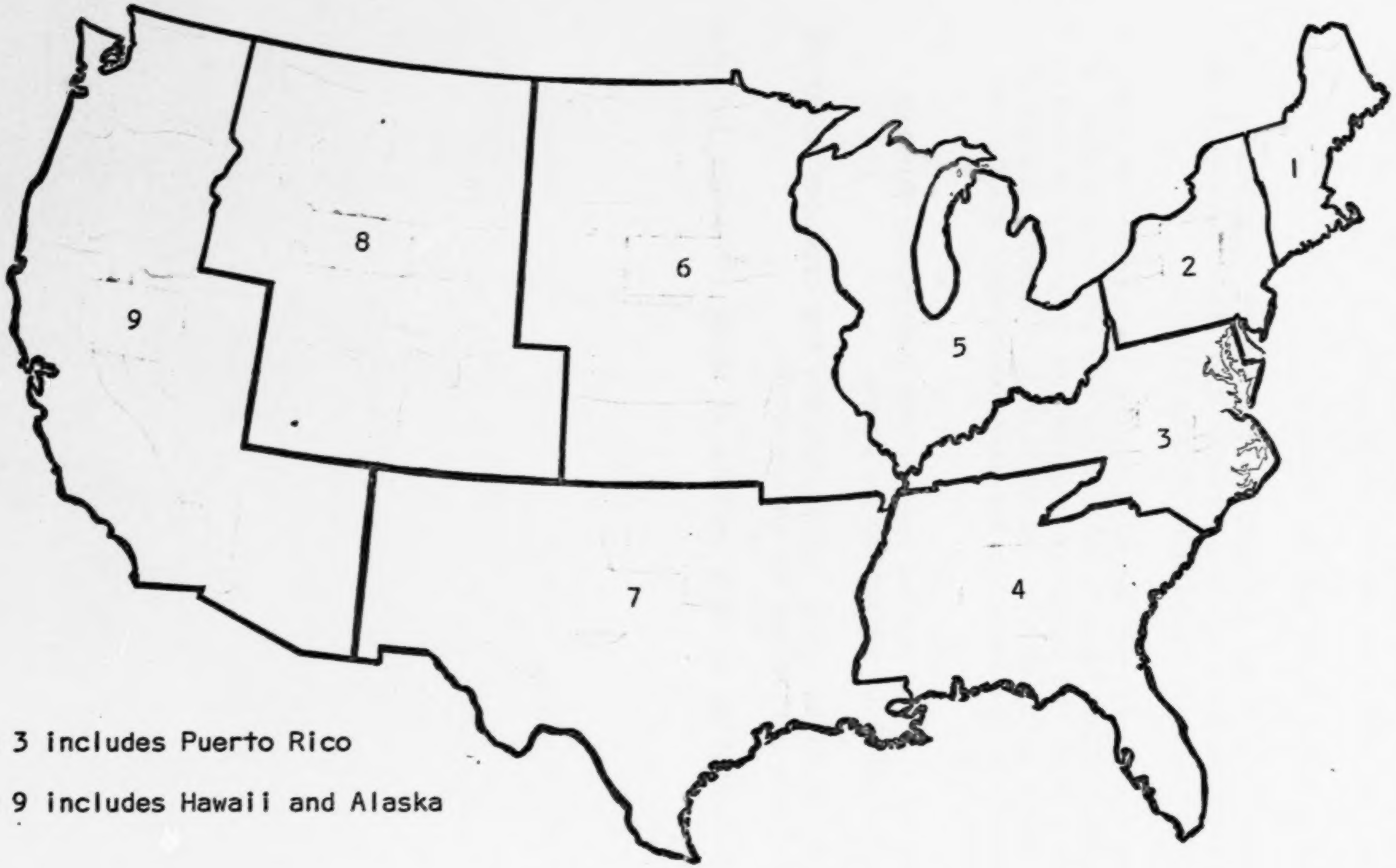
The Applicability File was designed to correlate the serials listed in ACCESS and (a) lists of serials covered by abstracting and indexing services for aerospace, agriculture, biology, engineering, geology, mathematics, medicine, metallurgy, meterology, nuclear science, physics, and psychology as well as for science and technology in general; (b) lists of frequently used scientific and technical serials developed from library usage studies; (c) lists of serials considered to be important to various disciplines, e.g., as determined by citation count studies; and (d) lists of "core" serials for other disciplines, e.g., medicine, biology, metallurgy, physics, etc.

Establishing Data Collection Points

For this phase of the design, it was only necessary to establish data collection points for the acquisition of data for the Interlibrary Loan File. The data for ACCESS and the inventory of the CAS Document Collection had already been collected and data for input to the Applicability File could for the most part be derived from materials already owned or being acquired by CAS.

To obtain interlibrary loan and facsimile request data that would be truly representative of national traffic, it was decided to collect the sample from 19 libraries distributed throughout the nine U. S. Office of Education regions. (Figure 1)

Published interlibrary loan statistics were reviewed(15)(16) to produce a file of approximately 250 candidate libraries whose volume of interlibrary loan traffic warranted consideration as data collection points. These candidates were further divided by USOE regions and analyzed to determine the nature of their collections and to ascertain whether they included a substantial file of scientific and technical serials. This second screening reduced the number of candidates to 20. To the directors of these 20 libraries, the CAS project staff sent letters (see Appendix 5) which explained the overall nature of the project and stated the specific conditions of participation. The letters also requested permission for a site visit by the contract staff to the libraries interested in participating in the project. As a result of these visits, 19 libraries agreed to participate by



Region 3 includes Puerto Rico

Region 9 includes Hawaii and Alaska

Figure 1

UNITED STATES OFFICE OF EDUCATION REGIONS supplying sample request forms. In return for their participation the source libraries were assured that:

- Their names would not be revealed.
- The sample forms collected would not be examined to determine the subject matter of the literature that the libraries were furnishing to any client.
- The data would not be used by the contractor for any purpose other than to determine the characteristics of the serial and congress proceedings involved in interlibrary loan traffic and certain performance characteristics of the interlibrary loan processing within the libraries.
- The data would not be used by the contractor for any promotional or marketing purposes.
- They would be fully reimbursed for any expenses incurred by their participation in the work.

The distribution by USOE regions of these libraries is shown in Table 1.

TABLE 1

GEOGRAPHIC DISTRIBUTION OF LIBRARIES PROVIDING THE INTERLIBRARY TRANSACTIONS SAMPLE

USOE Region	Inclusive States	Number of Libraries in the Region
1	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont	2
2	Delaware, New Jersey, New York, Pennsylvania	3
3	District of Columbia, Kentucky, Maryland, North Carolina, Virginia, West Virginia, Puerto Rico	2
4	Alabama, Florida, Georgia, Mississippi, South Carolina, Tennessee	2
5	Illinois, Indiana, Michigan, Ohio, Wisconsin	2
6	Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota	2
7	Arkansas, Louisiana, New Mexico, Oklahoma, Texas	2
8	Colorado, Idaho, Montana, Utah, Wyoming	2
9	Alaska, Arizona, California, Hawaii, Nevada, Oregon, Washington	2

Review of Objectives and Statement of Questions

Before proceeding to the systems design, the contract staff met with the committee of consultants to review the four broadly-stated objectives and to re-state them as a series of specific questions to be answered with numerical data derived from the study. The result of this analysis was the series of nine questions presented in Table 2. These questions served the contract staff and the computer systems designers as the basis for determining:

a. What specific elements of data were needed in each computer-based information file.

b. What analysis of this data had to be accomplished by computer program.

c. What computer tabulations (reports) would be needed by the contract staff in order to provide answers to the questions.

TABLE 2

NINE QUESTIONS TO BE ANSWERED BY THIS STUDY

I. Are the serials and non-serials included in ACCESS available from U. S. libraries?

II. What are the characteristics of the scientific and technical serials and conference proceedings volumes involved in interlibrary traffic?

III. What are the characteristics of interlibrary request traffic flow?

IV. What are the variations in the characteristics of interlibrary requests generated in the different geographical areas of the U. S.?

V. What are the relationships between the various characteristics of filled interlibrary requests and the time required by the surveyed library to process the request?

VI. What are the relationships between the various characteristics of unfilled interlibrary requests and the time required by the surveyed library to process the request?

VII. Are the serials and conference proceedings volumes held by CAS (since 1956) needed as backup for the present "interlibrary loan" network?

VIII. Are the findings of this study applicable to scientific and technical disciplines other than chemistry and chemical engineering?

IX. Are existing lists of chemical and chemical engineering serial literature applicable to scientific and technical disciplines other than chemistry and chemical engineering?

Data Collection

Applicability File data collection was relatively simple. A review of library and information science literature from 1950 to date identified several studies which included lists of scientific and technical serials of importance to specific scientific and technical disciplines or to science and technology in general. Most of these documents were found in the CAS Library, as were the current lists of serials being abstracted or indexed by the major information processors for science and technology. Studies or lists of serials that were not held by the CAS Library were acquired for input to the Applicability File.

To provide input to the Interlibrary Loan File, two samples of interlibrary loan and facsimile request forms were collected from the 19 source libraries (see Appendix 6). The first, referred to in this report as the "characteristics" sample, was drawn from records of requests that each library had processed during the previous year, and consisted of 10% of the requests for scientific and technical serials and conference proceedings volumes. This sample was designed to provide data on the characteristics of the serials and non-serials represented in the overall interlibrary loan and facsimile request traffic. The second sample, drawn from requests that the libraries were currently receiving during the sampling period, has been identified in this report as the "performance" sample.

The forms used in gathering this second sample had supplemental data added by the nineteen resource libraries so that intralibrary performance characteristics of loan- and facsimile-request handling could be judged. These supplemental data included:

1. The date the library received the request.

2. The degree of difficulty in filling each request. This was indicated on the form or letter by means of the following code: R -- Routine; N -- Non-routine; or D -- Difficult.

3. The reason for any non-fulfillment of requests because of faulty reference. This was noted by the following code: I -- Incomplete; N -- Not Correct; or G -- Garbled or Unintelligible.

4. The name of any bibliographic or document-locator tool (e.g., a union list) that was used to determine whether another library owned a needed item. Codes used were:

ULS -- Union List of Serials, NST -- New Serial Titles, NUC -- National Union Catalog, CA -- Chemical Abstracts List of Periodicals, or the title of whatever other union list was used.

5. Indication when the request was filled with a facsimile copy (microfilm or photoprint) in lieu of loan of original. In this case we asked that the words microfilm or photoprint be circled on the form or noted on a letter request.

The actual collection of data for the Interlibrary Loan File sample began in January 1968 and continued through June 1968.

The characteristics sample was obtained by having each library submit transaction data for one full year. These reports were received in various forms: some libraries sent their file copies of the original request forms, while other sent microfilms or photocopies of their files for the entire year. From these the contract staff drew the 10% sample for each library. Other libraries provided the contract staff with a 10% sample of their previous year's activity records, some sending the original records and others sending facsimiles, either photocopies or microfilms.

For the performance sample, each library was asked to send to the contract staff photocopies of approximately 500 interlibrary loan or facsimile requests received over an eight-week period. This requirement was flexible, because of the differences in the processing techniques used at the different libraries and because of the variations in the rate of traffic of each. For example, two of the libraries could have provided all 500 sample requests within one or two weeks, others required the full eight weeks to provide the 500, and one, by the end of eight weeks, had received fewer than 300 requests for scientific and technical serials or conference proceeding volumes.

A schedule for drawing the sample was established with each library. For the libraries receiving or generating a high volume of traffic, the first ten requests processed each day were flagged for sending to CAS. Libraries at which the traffic in scientific and technical interlibrary loans was lower found it necessary to pull more requests each day. Some of the libraries had more than one interlibrary loan request receipt center. In these instances the sample was proportionately divided between the various sources and the percentage of the 500 requests to be provided by each center was based on the total traffic at each center.

Procedures were also established with each library so that the supplemental data discussed previously would be added to the forms as they flowed through the normal processing channels. After the form had been processed and all supplemental data had been added, a photocopy of the form was made. These photocopies were mailed to the contract staff each week. The number of request forms for the performance sample and the time span of their collection from each of the 19 libraries is shown in Table 3.

Design of Reports for Data Analysis

The purpose of this phase of the work was to design the reports to be generated from the computer-based Applicability and Interlibrary Loan Files and from the ACCESS data base. These reports provided the data upon which the contract conclusions and recommendations were based.

These reports were keyed to the nine specific questions on which the Objectives of the Contract were based. In effect, the report definition and the statement of the processes by which each report would be derived constituted the system specification for the work Appendix 7 presents:

- study objectives,
- questions prompted by analysis of the objective,
- reports, by title, required to provide answers to the question,
- files from which the data would be drawn, and
- parameters of the search to be made to obtain the data for each report.

TABLE 3

NUMBER OF INTERLIBRARY LOAN REQUESTS PROVIDED BY THE 19 RESOURCE LIBRARIES FOR THE PERFORMANCE SAMPLE

Library Code	Size of Sample	Time Span
1	417	Jan.-Mar. 1968
2	431	Mar.-Apr. 1968
3	454	Feb.-Apr. 1968
4	546	Feb.-Mar. 1968
5	485	Feb.-Apr. 1968
6	469	Feb.-Apr. 1968
7	333	Mar.-Apr. 1968
8	382	Feb.-Mar. 1968
9	262	Mar.-June 1968
10	457	Jan.-Mar. 1968
11	344	Feb.-Mar. 1968
12	440	Feb.-Mar. 1968
13	512	Feb.-Mar. 1968
14	599	Feb.-May 1968
15	346	Jan.-Mar. 1968
16	610	Feb.-Mar. 1968
17	220	Mar.-Apr. 1968
18	355	Feb.-Mar. 1968
19	390	Feb.-Apr. 1968
TOTAL	8052	

Systems Design and Programming

The general system envisioned by CAS in its initial planning of this study called for the analysis of three interlinkable, machine-readable data bases. Because one of the three, the ACCESS data base, had already been designed and was in the process of being built, the remaining two, the Applicability File and the Interlibrary Loan File data bases, were to be made compatible with the ACCESS file.

All three files required at least one common data element to allow for the interlinking necessary to produce reports from data contained in more than one file. Since titles of serials and conference proceedings volumes were common to all three types of records that would be input to the files, it was decided that a standard code -- the ASTM CODEN -- for the titles would serve as the common link. The ACCESS system has an auxiliary disk file which equates CODEN to abbreviated titles, making it possible to retrieve such titles when desired.

An overview of the system concept is presented in Figure 2.

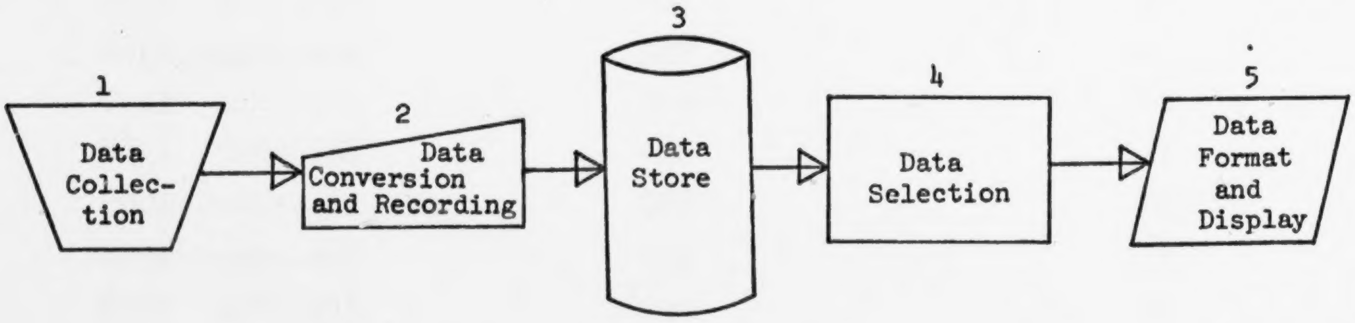


Figure 2

CONCEPUTALIZED SYSTEM DESIGN FOR PROCESSING REVIEW DATA

Required data (1) is converted to data elements that have standard format and content (2), and these are entered into a common data store (3). It should be noted in this case that the common data store actually consisted of three files, all sharing a standard file format. Data from the common data store could thus be selectively retrieved (4), and formated and displayed (5) to suit the particular requirements. Accordingly, it was not necessary to build a separate data file for each specific report required by the contract.

Knowing the computer reports and tabulations that would be needed as output from the files enabled the systems designers to define the specific data elements needed in each file and, working back one more step, to describe the manual and computer processes the system would require.

Thus, the systems design and programming effort included:

a. Defining the manual procedures necessary to convert the raw data into a form suitable for computer input. Flow charts for the Applicability File input generation and the Interlibrary Loan File input generation are presented as Appendixes 8 and 9.

b. Identification of the flow of information through the computer system and describing and writing the computer programs. Descriptions of the computer system and the programs required to generate the data analysis reports are given as Appendixes 10 and 11.

Data Conversion and File Building

This phase of the work involved identifying pertinent data on the documents collected for the Applicability and Interlibrary Loan Files, transfer of these selected data to data collection forms, and recording the data concerning the collection forms onto magnetic tape. This procedure is illustrated by Figure 3.

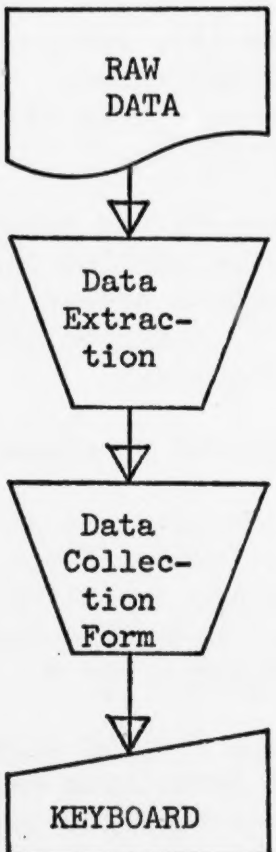

RAW DATA
Data Extraction
Data Collection Form
KEYBOARD
TAPE

Figure 3

FILE BUILDING WORK FLOW

1. Building the Applicability File -- This file was developed via the flow illustrated in Appendix 8, from source lists of serials known to be of interest to specific scientific and technical disciplines. It consisted of a manual card file of journal titles, with each card coded to show the discipline or disciplines to which the serial was applicable.

The raw data for the Applicability File consisted primarily of 40 lists of serial titles known to be applicable to a specific scientific or technical discipline or to science and technology in general. These lists were selected as the result of a survey of the literature, and represented: (a) lists of serials abstracted or indexed by the major secondary information processing services for various scientific and technical disciplines or subject area, (b) lists of frequently used serials developed by library usage studies, (c) lists of scientific and technical serials identified by independent studies as being especially pertinent to given subject area, and (d) lists of core serials for several disciplines. (See Appendix 12.) Besides these 40 lists, three more lists were added to the Applicability File. These lists comprised:

- Serials and conference proceedings volumes to be included in the ACCESS file.

- "Core" serials for chemistry and chemical engineering.

- Serials and conference proceedings volumes owned by the CAS Library.

Because of the many title duplications on these lists, it was necessary to create a single file of titles, with each title appearing only once. To accomplish this, the contract staff examined each list in sequence, adding each new title to the Applicability File as an entry on an Applicability Data Collection Form (Appendix 13). Each Form was preprinted to allow staff to flag all of the lists on which the title appeared. Thus, when the staff processing a given list encountered a title that had previously been included in the Applicability File, the Form for that title was merely updated to show the title's presence on more than one list. Each form was then coded assigning the ASTM CODEN appropriate to a particular serial title. If a serial did not have an ASTM CODEN, a "dummy CODEN" was produced and assigned. The authority for the standardized CODEN was the ASTM CODEN for Periodical Titles(17)(18)(19) and that for the dummy CODEN was the Dummy CODEN File. This file, which was created by a CAS computer program, consisted of six-character codes that included a machine-checkable figure. From pre-printed lists, the contract staff assigned the next available Dummy CODEN each time one was required. The title receiving that Dummy CODEN was then recorded and that Dummy CODEN was not used again.

The accurate assignment of regular CODEN also required professional-level personnel, because the ASTM CODEN manual alphabetizes titles using a word-by-word arrangement, while the arrangement of titles in the source documents varied considerably. These differences made it necessary to maintain a staff which was familiar with serial titles filing techniques and with the information tools involved. Following the coding process, the Applicability File Data Collection Form was filed by CODEN in the Applicability File.

The Applicability File resulting from this process consisted of entries for 27,524 different scientific and technical serials.

This master Applicability File was then sorted to remove all single entries, since such entries could not be identified as being applicable to more than one discipline. The remainder of the file, consisting of 9,960 titles with two or more entries from different source lists, was keyboarded onto magnetic tape for computer input. After verification and error correction, the data were computer-processed to form the Applicability File Data Base, while the original forms were filed.

Throughout this process, every practical effort was made to assure the overall quality of the data entering the file. The input was reviewed to eliminate any entry that was not a currently published scientific and technical serial. The authority files were cross-indexed to prevent duplication of identification code assignment, and a 10% sample of the data collection forms was routinely reviewed for accuracy by complete reverification of the data recorded on them. Appendix 14 reviews the keyboarding and proofing operations used in this process.

2. Interlibrary Loan File Generation -- As described above, the Interlibrary Loan File was built from two statistically valid samples drawn from each of 19 major resource libraries that participated in this phase of the study.

The first sample was the Interlibrary Loan File "performance" sample. It provided data on the current activity of interlibrary loans. The second sample, the "characteristics" sample, was concerned with the descriptive traits of the interlibrary loan system. The performance sample consisted of a random selection from each library in the study population of 500 interlibrary loan files for the period July 1966 through June 1967. (See Table 3.) To qualify for inclusion, each request had to be for a scientific or technical primary source document, that is, an issue or several issues of a serial or else a conference proceedings volume.

Interlibrary loan records for the characteristics sample were received for variable time periods (representing the different fiscal years of the 19 libraries). The material was submitted either as originals or as photocopies or microfilms of the original forms. Some libraries sent a full year's record from which contract staff drew the sample, while others sent a predrawn sample. In contrast, the performance sample always consisted of photocopies or pre-selected request forms and letters.

As in building the Applicability File, every practical effort was made to assure the overall quality of the data entering the files. Sample interlibrary loan forms were individually reviewed to eliminate those that were not requests for scientific or technical serials or conference volumes. The generation and maintenance of the various authority files were strictly controlled by cross-indexing techniques to prevent duplication or any other ambiguity. All data collection forms were subject to review prior to their release to the data control operation which was accountable for the actual number of data sheets sent to and returned from keyboarding. This review consisted of extracting 10% of the forms, and performing a complete reverification of all data entered on the form by comparing the data sheet with the original source item.

The Interlibrary Loan File was developed via the flow depicted in Appendix 9. The two interlibrary loan request samples, performance and characteristics, were processed differently. The characteristics sample receipts were first examined to determine whether a library had sent a 10% sampling or the full receipts for an entire year's activity. If specimens from an entire year's interlibrary loan activity had been sent, the contract staff selected a random 10% sample for further processing. If original records had been sent to CAS, they were photocopied, and the photocopies were routed to the log-in operation. If photocopies had been sent to CAS, they were routed directly to the log-in operation. Originals were returned to the library if requested.

Performance sample receipts were routed directly to the log-in operation, since only photocopies were included in this sample.

The log-in operation's primary function was to provide quantity and work flow control of the Interlibrary Loan File samples.

This was accomplished via the use of a Log Book divided into four sections (see Appendix 15): (1) The Individual Log Sheet Section was a record of interlibrary loan request samples received from and returned to the participating libraries, (2) the General Log Sheets Section was a record of material sent by participating libraries that included the date it was received by CAS, date sorted, date photocopied, date refiled, and date returned or destroyed, (3) the Voided ID Numbers Section enabled the CAS staff to determine the number of Data Sheets coded for the study, and (4) the Keyboarding Records Section was maintained to control the number of Data Sheets that were sent to and returned from keyboarding. Every ILL sample item entering the data input flow for the study was logged in, after which the data on it could be converted to a form useful for transcription onto magnetic tape and subsequent computer manipulation and report generation.

For input to the system in a standard format and content, OEC Interlibrary Loan Study Data Sheets (see Appendix 16) were used in the data conversion process. Each interlibrary loan request was translated into a maximum of twenty-four (24) discrete data elements. Each data element was tagged for computer identification, and the raw data translated into a variable data code, or string, as specified in the Data Collection Coding Manual (see Appendix 17).

The data conversion process began with the assignment of an Organization Code to each interlibrary loan specimen. For each borrowing or lending library a code was created consisting of the five-digit U. S. Mail Zip Code plus two other digits assigned by CAS. Foreign libraries received a seven-character code assigned by CAS.

After the assignment of an Organization Code, the journal title being requested on each interlibrary loan form was assigned an ASTM CODEN in a process similar to that used for the Applicability File.

Following the assignment of these two primary codes, the remaining data sheets for each interlibrary loan specimen were completely filled out. The data included such information as volume number, pagination, language, degree of difficulty in filling the request, dates associated with the request, the name of the requester, form of request, and so forth.

After the data sheet for an item was completed, a sequential data sheet identification number was assigned, the original interlibrary loan request was attached to the data sheet, and the material was routed through the Quality Control Function. Every tenth data sheet was checked by Quality Control and rerouted through the data conversion process if errors were present. The mean error level, based on the Quality Control Sample, was 0.5%, which was considered acceptable.

The next station in the flow of material through the file-building process was Batch Control. Data sheets plus the original interlibrary loan requests were grouped in batches of 50, which were each numbered. Each batch was entered in the Keypunching Records Section of the Log Book, and then routed to keyboarding, where the data sheets were entered directly on computer-readable magnetic tape. Following verification of the data sheet-to-magnetic tape conversion and correction of errors, the data sheets were returned to the CAS Library, and the material on the magnetic tapes was released to the Interlibrary Data File for eventual analysis, evaluation, and report generation.

Data Analysis and Report Preparation

As each of the data files was completed, computer programs prepared any reports that depended solely upon data in that file. Data-analysis reports contingent upon combined data from one or more files were prepared as the necessary files became available. These data-analysis reports, which are described in Appendix 7, were reviewed and analyzed by the staff to develop the findings presented in the "Results" chapter.

CONCLUSIONS

The major conclusions of this study are reported in this section. Results that lead to these conclusions are in the following section of this volume of the report, which also contains the tables referred to here. Recommendations that follow from these conclusions have been presented in Volume I of this report.

These conclusions correspond to the four major objectives of this study of the availability of scientific and technical primary source documents within the United States. These objectives, briefly restated, are:

A. To determine the availability of the scientific and technical serials and conference proceedings volumes from major U.S. resource libraries.

B. To ascertain the effectiveness of interlibrary loans in meeting the demand for scientific and technical serials and conference proceedings volumes.

C. To gauge the U.S. library community's need for back-up collections of scientific and technical literature such as that held by the Chemical Abstracts Service.

D. To project the results of this review to scientific and technical disciplines other than chemistry and chemical engineering.

Although the conclusions derived from this study may reiterate similar statements previously expressed by others concerned with document availability, they also reinforce them. By reviewing this problem from a national point of view and by using data recently collected nationwide, this report presents conclusions that can define the scope and the nature of deficiencies in document availability more clearly than has been possible from previous studies based on data of a more local nature.

A. Availability of Scientific and Technical Serials and Conference Proceedings Volumes

The full range of scientific and technical journals and conference proceedings volumes is not available from United States libraries at this time.

According to an analysis of the content of ACCESS, which contains the list of serials and conference proceedings used in this study, libraries in the United States do not own at least one copy of each scientific or technical paper published in a serial or a conference proceedings volume (Table 4).

For each serial identified in this study, availability, or lack of availability, was determined by comparing the serial's publication history against the holdings data for that serial as furnished by the 325 participating libraries in the United States. This review was programmed to identify the presence of complete sets and incomplete or partial sets as well as the absence of sets in the fifty states of the United States, the nine U.S. Office of Education regions of the United States, and in the United States as a whole.

To illustrate, if only two libraries, each in a different state and USOE Region, reported partial holdings for a serial, only these two states would be credited with having partial files. The two regions would also be credited with having partial files; however, if when added together the two partial files equaled a complete one, that file would be registered as complete for the nation as a whole.

The review revealed that collectively, the 325 U.S. libraries held complete sets for only 10,810 of the 16,361 serials listed in ACCESS. It also revealed that these 325 libraries held incomplete or partial sets for 4321 of these serials, while for the remaining 1230 serials no issues were to be found at any of the 325 libraries.

Since it is an established fact that the use of the serial literature decreases rather sharply within a few years after publication date, the partially held sets were analyzed to see whether or not all issues published since 1956 could be found in at least one of the 325 libraries' collections. This analysis showed that for 2238 of the 4321 partially held serials, all issues published between 1956 and the date of the study were to be found in these 325 libraries. Thus, overall availability for recent literature is somewhat better than that for all literature.

When the availability of these 16,361 serials was reviewed for the nine U.S. Office of Education regions, analysis identified deficiencies that were much more pronounced. The average USOE region contains complete sets of only 4867 serials and partial sets of 4932, while sets for 6561 serials were missing altogether.

The analysis by state identified Illinois as the state with the most complete overall holdings, where 6335 of the 16,361 serials were represented as complete sets and 5439 as partial sets. Only 4587 of the serials were found to be missing altogether. The state with the poorest collective files was Alaska, where only

340 of the sets were complete, 3724 of the sets were partially complete and 12,297 of the titles were not held at all (Table 5).

Included in ACCESS were 2773 conference proceedings volumes. When these were checked for availability from the 325 U.S. libraries, 2364 were found to be present and only 409 were found to be absent from their collective holdings (Table 6).

For each scientific and technical discipline as well as for science and technology in general, there exists a sub-set of the total known serials that are more frequently used than others. These serials have been referred to at various times as "core" serials or "prime" serials. Of the 16,361 serials listed in ACCESS, 3197 had been identified by secondary information processors as being of prime importance to their scientific and technical discipline or from published lists as being "the most frequently used serials." When the availability of these from the 325 U.S. libraries was studies, it was found that the libraries collectively held complete sets for 2558 (80.0%) of these serials, that they held only partial sets for 608 (19.0%) of the serials, and that only 24 (1.0%) of these serials were not available at all from the 325 ACCESS participating libraries (Table 7).

Admittedly, data from a file such as ACCESS do not constitute a census of the availability of all scientific and technical serials and conference proceedings volumes held at each and every library in the United States. However, with few exceptions, holdings of the major U.S. resource libraries are listed in ACCESS. Therefore, it seems very unlikely that even a complete census would disclose the location in the United States of every scientific and technical document.

B. Interlibrary Loan Effectiveness

Interlibrary loans support user requirements for source documents, but both the effectiveness and the efficiency of this method of document request fulfillment need improvement.

Findings based on a detailed analysis of more than 70,000 interlibrary loan requests generated by over 3300 requesters* and collected nationwide from 19 major resource libraries have provided data for the above general conclusion and the numerous specific conclusions and observations that follow.

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* An analysis of these 3300 requestors by geographic location and type of organization is presented in Appendix 28.

Only six out of every seven interlibrary loan requests are filled on the first attempt.

For this review, 70,686 interlibrary loan requests were collected. Of these, 59,484 had been filled and 11,202 had not.

A relatively small number of serials contain the majority of the documents requested on interlibrary loan.

Although the review identified 11,370 serials and 912 conference proceedings volumes involved in the interlibrary loan traffic, 25% of all requests were for papers published in only 195 different serials. It took an additional 655 journals -- a total of 850 -- to account for 50% of the requests. Also, there were 5444 serials and conference proceedings volumes that were represented by only one request of the 70,686. (See Table 1 and Figure 4.)

Interlibrary loan requests are too frequently sent to libraries that cannot supply the needed document.

Analysis of the 11,202 loan requests that were not filled indicated that many requests had been unsuccessfully submitted more than once. There were two significant reasons why these requests had not been fulfilled. First, they had been sent to a library that did not own the publication being sought, and second, although the library may have once owned the item, it was not available when the request was received (Table 27).

Photocopying is the most frequently used but not the most expedient medium for fulfilling loan requests.

The 59,484 filled requests included 54,254 for which the fulfilling medium could be identified. Photocopying was used for 46,535 or 85.8% of the total filled requests. Originals were lent to fulfill 6358 or 11.7%, while microfilm copies were used to satisfy only 1361 or 2.5% of the requests (Table 24).

At six of the 19 libraries that provided the interlibrary loan sample, 95% or more of the successful requests were filled with photocopies, and of the 19 libraries, 11 used photocopy for over 80% of the filled requests. Only one of the 19 libraries used photocopies as a fulfillment medium less than 50% of the time. Lending of originals to fulfill requests varied from 61.8% of the total requests filled by one library, to less than 1% filled by two others. Microfilm use ranged from 8% at one library to less than 1% at 13 of the 19 libraries (Table 25).

A study of the relationship between fulfillment medium and document age for documents published prior to 1950 indicated slightly more use of lending originals and microfilm than of photocopy (Table 26).

The use of photocopying was found to slow down the fulfillment process. By the end of the third day after receipt, lending institutions had processed 63.1% of the requests they had filled by the lending of originals, 48.9% by photocopying, and 34.6% with microfilm (Table 42).

The age of the publication being requested does not appreciably affect the outcome of the request.

The distribution by age of requested publication for the interlibrary loan requests studied disclosed that 56.4% were published during the years 1960 through 1968, 22.6% during the years 1950 through 1959, 13.4% during 1930 through 1949, and 7.6% prior to 1930. The age distribution for the filled requests was 55.7% for those published during the years 1960 through 1968, 23.6% during 1950 through 1959, 13.8% during 1930 through 1949, and 6.8% for those published prior to 1930. For the 11,202 unfilled requests the distribution pattern changed slightly with 63.6% of the unfilled requests being for items published during the years 1960 through 1968, 19.1% during 1950 through 1959, 10.8% during 1930 through 1939, and 6.4% prior to 1930 (Tables 2, 26, 28).

The age of the requested publication has little effect on the processing effort.

For the performance sample of 8052 loan requests, the recipient libraries were asked to indicate which requests were routine, non-routine, or difficult to process. For all years, 84.3% to 91.1% of the requests were considered routine, 9.6% to 12.4% were indicated as non-routine, and 0.9% to 5.2% were designated as difficult. The age of the document seems to have little bearing on whether or not the request was easy or difficult to process (Table 51).

Interlibrary loan requests are predominantly for documents published in four languages (English, German, French, Russian), and the language affects both the chance for fulfillment and to some extent the speed of fulfillment.

The total sample of 70,686 requests was divided by language of publication of the requested document (Table 14). The filled and unfilled requests in the performance sample were similarly divided and investigated. These data, expressed in percentages of the totals, do not indicate that any significant relationships exist between language and success or failure of the loan request, except for Russian, Italian, Japanese, and the lesser used languages where the percentage of unfilled requests is approximately twice that for filled requests.

	Total	Filled	Unfilled
English	80.8%	82.5%	74.7%
German	7.8%	7.6%	7.0%
French	4.1%	3.7%	4.8%
Russian	3.3%	2.1%	5.3%
Italian	1.1%	1.0%	2.0%
Japanese	.9%	.8%	2.0%
Other	2.0%	2.3%	4.2%
TOTAL	100.0%	100.0%	100.0%

Publication language of documents for which requests were received by each of the source libraries showed no discernible variations over the national distribution, that is to say, no one library could expect to receive a greater or lesser percentage of requests for publications in a given language than any of the other eighteen libraries (Table 15).

When these requests divided by language were subdivided by year of publication, a more frequent demand was detected for current Russian, Japanese, Polish, and Czech language documents than for the older documents published in these languages. When compared to the national average of the total sample distribution by age (Table 13), German and French documents published prior to World War II proved more in demand than those published since (Table 16).

Interlibrary loan requests for publication printed in English were generally filled more promptly than were requests for Japanese or Russian published languages. For example, by the end of the third day after receipt, the source libraries had processed 51.2% of all requests for English language publications while they had only processed 41.6% of the Japanese and 38% of the Russian language requests that they eventually filled (Table 39).

For unfilled requests, the language of publication had little effect on the libraries' processing time. By the end of the third day, the percentage of the English and Russian requests was almost the same, 43.5% for the English and 43.7% for the Russian while 58.8% of the unfilled requests for Japanese language publications had been handled (Table 40).

The number of pages the requested document contains does not affect the recipient library's processing time.

Included in the 70,686 interlibrary loan requests were 57,156 for which it was possible to determine the number of pages in the requested document.

These 57,156 requests were divided into five groups on the basis of the number of pages in each request publication (Table 17). The 8052 interlibrary requests were similarly divided on the basis of the libraries that had received the request and second, on the geographic location of the libraries that generated the requests. All three of these analyses indicated essentially the same distribution pattern for the samples when viewed from the standpoint of page length (Tables 17, 18, 19).

When page length was investigated as a factor that might affect processing time, the investigators found no significant relationships between page length and processing time for either the filled or unfilled requests. (Table 41).

For recent literature, "at the bindery" and "not yet received" are two frequently used reasons for non-fulfillment of requests.

Requests for documents less than five years of age are thirteen times more likely to go unfulfilled because the publication is at the bindery than are requests for documents over five years of age. They are seven times more likely to go unfulfilled because the document has not as yet been received (Table 29). In all other categories of reasons for non-fulfillment, there were no appreciable correlations between the reasons of non-fulfillment and the age of the requested publication.

Invalid citations result in unfilled requests.

In the performance sample of 8052 loan requests, 6909 were filled and 1143 were not. Of the 6909 filled, only 508 or 7.4% had invalid citations. However, of the 1143 unfilled requests, 1009 or 88.3% had invalid citations (Table 32).

In the total sample of 70,686, the total number with invalid citations is not known, but it was established that of the 11,202 unfilled requests at least 1008 went unfilled because the document could not be identified (page II.83).

The transmission of requests from borrower to lender seems inefficient.

When the 68,634 loan requests that were both generated and received within the U.S. were analyzed to determine the traffic pattern (Table 10), 46,328 were found to have been intra-regional, i.e., the traffic was between two libraries within the same USOE Region. Less than half as many, only 22,306, were inter-regional requests. Yet, when the media used for transmitting 67,222 of these 68,634 loan requests were reviewed, fewer than 8000 had been transmitted via TWX, telephone, or by courier (Table 20).

The only significant use of the telephone was by requester libraries in Regions 1, 2, 4, and 5 where over 5% of the requests generated were telephoned to the "lending" library. Only in Region 6 did libraries use couriers to any degree, while in only three regions were over 2% of the requests sent via TWX (Table 21).

It can be assumed that telephone, TWX, and courier requests are received at the "lending" library on the same day they are sent by the "requesting" library. On the other hand mailed requests take an average of three days to be received with a range from zero (same day) to over 31 days (Table 22).

Since over 65% of the traffic was intra-regional, the use of TWX to transmit requests seems surprisingly low.

Interlibrary loan requests that were filled required less processing effort than those that were not filled.

Each of the 8052 loan request forms in the performance sample carried one of the three "level of effort" indicators. These 8052 requests were designated routine, non-routine, or difficult and were reviewed from the standpoint of the total sample, the regions of the country where the requests were generated, and for each of the 19 recipient libraries.

Because of the differences in interpreting the meaning of routine, non-routine, and difficult, and in the expertise of the library staff assigned to handling interlibrary requests, variations were noted between the regions and the recipient libraries even though such variations are difficult to interpret. There was, however, rather conclusive evidence that filled requests were generally considered routine to process. For example, 88.2% of the filled requests were considered as routine to process, 9.3% of them were considered non-routine, and 2.5% of them were considered difficult. But for the non-filled requests, only 61.4% were considered as routine, while 27.2% were non-routine, and 11.4% were termed difficult.

In this latter category, the 19 source libraries rated from zero to 10.5% of the requests they filled as difficult while they rated up to 81.8% of the unfilled requests as difficult. (Tables 48, 49).

When degree of difficulty was related to processing time, it was found that routine requests, whether filled or not, were usually handled faster than those categorized as non-routine or difficult. In fact, almost twice as many routine requests were processed on the day of receipt as were the difficult to handle requests (Table 52).

Multiple item requesting increases process time.

Frequently loan requests for several documents will be combined into a single letter or other communication. A review of the number of days required by the recipient library to process these multiple-item requests showed that as the number of documents per request increased, the time required for the recipient library to process the request also increased, whether or not the requests were filled or unfilled (Table 47).

Location of libraries does not directly influence characteristics or processing of requests.

According to this study, geographical location of neither the requester nor the recipient library significantly influenced the other characteristics measured. That is, there were no outstanding variations in the characteristics of the scientific and technical publications requested on interlibrary loan, in the characteristics of the requests per se, or in the processing of the request that could be attributed entirely to location.

- Although libraries tend to direct the majority of their interlibrary loan requests to other libraries located within the same or adjacent USOE Regions, they are not reluctant to attempt to fulfill user requests from any available resource (Table 10).

- Except in Region 4 the age distribution pattern of the requests generated in any one USOE Region did not vary more than five percentage points from the national distribution pattern for any given age grouping (Table 13).

- There are no meaningful variations in the language of publication distribution patterns for requested documents between the recipient libraries (Table 15).
- The medium used to transmit interlibrary loan requests tends to vary depending upon the USOE Regions where the requestor is located (Table 21).
- The distribution pattern for the length of the requested document is not appreciably affected by geographical location of either the requester or the library receiving the request (Table 19).
- The time, measured in days, for mailed interlibrary loan requests to arrive at their destinations tends to exhibit similar distribution patterns regardless of the recipient library's geographical location (Table 23).
- Although the medium libraries use to fulfill interlibrary loan requests tends to vary somewhat from library to library, this variation seems to be more influenced by local practices than library location (Table 25).
- Reasons for non-fulfillment given by libraries receiving requests do not appear to be affected by the location of the requester or the receiver libraries (Tables 30, 53).
- The number of interlibrary loan requests bearing invalid citations that a library receives is not directly related to its geographic location nor to that of the requesters (Table 31).
- The number of days libraries require to process interlibrary loan requests varies appreciably from library to library. However, there is no reason to infer a relationship between processing time and the location of either borrower or lender (Table 36).

Level of processing effort varied little in participating libraries.

The percentage of routine, non-routine, and difficult requests did not vary pronouncedly among the 19 source libraries.

For filled requests, the librarians largely agreed that about 85% were routinely handled and 15% were non-routine or difficult. For unfilled requests about 65% were identified as routine to process, 25% as non-routine, and 10% as difficult (Tables 49, 50).

There is no direct relationship between the age of a requested document and the validity of the citation the requestor uses.

There were 2995 loan requests for which both the publication date of the requested document and the invalidity of the citation were determinable. When these 2995 requests were sorted by age, the distribution pattern was found to closely approximate that of 67,357 requests for which the age of publication was known. This leads to the conclusion that the occurrence of requests with invalid citations is rather evenly distributed throughout the full range of interlibrary loans regardless of the age of the requested publication (Table 31).

Libraries process interlibrary loan requests they cannot fill as promptly as those they can fill.

An analysis of the 7109 filled and unfilled interlibrary loan requests provided data on the time (in days) the libraries required to process the requests. It was found that more unfilled requests were processed the same day received than filled ones. However, during the second through the fifth day more filled requests were processed than were non-filled ones. After the fifth day, unfilled requests were again processed more rapidly (Table 37).

Nearly identical findings were obtained when processing time was studied for filled and unfilled requests in the performance sample, although some minor variations were detected for the processing times for these among the 19 libraries that provided the performance sample (Tables 35, 36).

Libraries process interlibrary loan requests received via telephone, TWX, or courier more rapidly than those they receive by mail.

For both filled and unfilled requests the processing time of the recipient libraries was found to be substantially less for requests received via telephone, TWX, or courier than for those they received by mail. By the end of the third day, 65.2% of the filled requests received by telephone, TWX, or courier had been processed as had 84.6% of the unfilled requests. However, only

42.0% of the filled requests received by mail had been processed, as had 40.3% of the unfilled requests received by mail.

By the end of the seventh day, 94.0% of the filled and 96.8% of the unfilled requests received via telephone, TWX, or courier had been processed as compared to 81.8% of the filled and 82.9% of the unfilled mailed requests (Table 42).

There is no discernible correlation between the length of time required to advise a requestor that his request cannot be filled and the reason for non-fulfillment.

Unfilled requests in the performance sample were sorted according to reason for non-fulfillment and then into subgroups according to the number of days between date of receipt of the request and date of return to the requester. Analysis of this data did not disclose any positive correlations. It did indicate that requests for publications that are not owned, that are held in reserve or that do not circulate require less processing time than do requests for publications that are at the bindery or that are inadequately identified on the request form (Table 44).

Requestor verification of the document citation on the interlibrary loan request form does not assure faster processing.

In the performance sample 3045 requests had been verified and 2414 had not. When these data were compared to the number of days required by the recipient libraries to process both the filled and unfilled requests, it was found that the processing time was not significantly decreased by having the requester provide these verified citations (Table 45).

The validity of the citation on the interlibrary loan request affects the speed with which requests are processed by recipient libraries.

The 8052 loan requests on the performance sample were divided into those with valid citations and those with invalid citations. These two sets were further sorted according to the number of days the recipient library required to process the requests

An analysis of this information indicated that by the end of the third day after receipt, 51.4% of the filled requests with valid citations had been handled, while only 35.4% of the ones with invalid citations had been processed. It also revealed that by the end of the third day, 50.5% of the unfilled requests with valid citations had been processed, while only 45.7% of those with invalid citations had been handled (Table 46).

C. The Need for Document Back-up Resources

The U.S. resource libraries have need of document back-up collections such as that owned by the Chemical Abstracts Service.

Users of scientific and technical literature must have access to required documents from their local libraries. If these documents are not available from the resources owned by their local libraries, then these local libraries must be able to acquire the documents from another source.

The analysis of the ACCESS content identified 1230 serials and 409 conference proceedings volumes that were not held by any of the 325 U.S. libraries participating in the ACCESS project (Table 4).

Some 619 of these 1230 serials are in the collection of the CAS Library. For these 619 serials, issues published since 1956 are available in the United States. A similar check of the missing 409 conference proceedings volumes indicated that 307 of them are held by CAS.

The review of the 70,686 interlibrary loan requests identified 11,202 that had not been filled. In addition, the review identified another 1047 requests that the recipient libraries were not able to fill within ten days after receiving the request. These 12,294 loan requests were checked against the CAS Library inventory and it was found that from the CAS Library 4267 of the requests could have been filled.

It was also found that, if CAS had maintained copies of the pre-1956 serials and conference proceedings volumes that it had routinely acquired and disposed of when they were no longer needed, an additional 3797 of these requests could have been filled. These comparisons of missing files and unfilled or untimely filled interlibrary loan requests with the inventory of the CAS Library collection clearly indicate that access to CAS resources by U.S. libraries would have increased the availability of scientific and technical source documents within the U.S.

D. Applicability of the Results of This Review

The findings of this review of the availability of the scientific and technical serials and conference proceedings volumes of interest to chemistry and chemical engineering demonstrate the common applicability of document use and interest for a number of other scientific and technical disciplines.

Although this study of document availability was based on a population of scientific and technical serials and conference proceedings volumes of established interest to chemistry and chemical engineering, the findings have indicated that the source literature for the chemical sciences is distributed throughout the full range of the source literature for science and technology. The findings have also established that several different disciplines, including chemistry and chemical engineering, share a mutual dependence upon an overlapping segment of the total primary literature.

To gauge this degree of mutual dependence, a unit of measure, the scientific and technical serial, was selected. For example, a given primary serial may be covered by several different abstracting services, each providing subject oriented routes of access back to the same original source document. By quantitatively identifying journal overlap between the lists of serials covered by various scientific and technical disciplines and/or mission-oriented secondary services and the serials included in ACCESS, it has been possible to ascertain the relevance of this study to these other scientific and technical disciplines. By establishing the degree of overlap between lists of serials of a more general scientific and technical interest and those in ACCESS, it has been possible to gauge the applicability of these findings to the full range of the scientific and technical literature.

Five studies of overlap were performed to determine the relationships between the currently published scientific and technical serials listed in ACCESS and those applicable to other disciplines or to science and technology in general.

The first involved 17 specialized scientific and technical secondary service coverage lists that were compared against the serials listed in ACCESS. The range of overlap by percentage was 27.2% for Psychological Abstracts to 82.2% for Nuclear Science Abstracts. The median range for all 17 lists was 55.6% (Table 54).

The second study compared the lists of journals covered by three general scientific and technical secondary services to the ACCESS content. Here the overlap was found to range from a low of 46.0% for British Technology Index to 71.7% for Applied Science and Technology, and 75.0% for PANDEX (Table 55).

The third review identified the overlap between the core serials for biology, medicine, metallurgy, nuclear science, and physics and the core chemical and chemical engineering serials listed in ACCESS.

This study disclosed the coincidence with the chemistry core serials to be 32.8% for biology, 18.5% for medicine, 26.8% for metallurgy, 55.3% for nuclear science, and 100.0% for physics. It also identified 628 serials common to two or more of the six core lists (Tables 56, 57).

The fourth part of this phase of the review identified the overlap between ten published lists of more frequently used scientific and technical journals and the serials listed in ACCESS. The overlap was found to range from a low of 59.0% to a high of 97.0%, with the median range of 86.0% (Table 58).

The fifth comparison determined the overlap between six published lists of serials identified by independent studies as especially pertinent to scientific and technical subject areas other than chemistry and chemical engineering. For these, the overlap was found to range from a low of 66.8% to a high of 93.3%, with a median percentage of 72.6% (Table 59).

Another area of applicability of the results of this review to related disciplines was the relationship between the serials and conference proceedings volumes listed in ACCESS and those involved in the interlibrary loan traffic for science and technology. The 11,202 unfilled loan requests represented 5453 different serials. Of these serials 2824 were listed in ACCESS, which accounted for 6858 of the unfilled requests.

Included in the 11,202 unfilled requests were 58 for conference proceedings volumes. Of these, 19 were for conference volumes listed in ACCESS (Table 60).

These findings identify specific areas of overlap among scientific and technical literature and in general demonstrate the common availability and applicability of documents and the overlap of document use for a number of scientific and technical disciplines other than chemistry and chemical engineering.

RESULTS

This chapter presents the detailed findings of this study, which are the basis for the Conclusions and Recommendations presented above. These Results reflect answers to the questions identified by the four major objectives of the review (pp. 3 and 4).

To answer some of the questions required the staff to compare state or regional findings with those of other states with national averages. To facilitate these comparisons data has frequently been expressed as percentages of identified totals.

Availability of Publications

The fundamental purpose of this phase of the study was to review the availability in the United States of the scientific and technical serials and conference proceedings volumes using titles applicable to chemistry and chemical engineering as shown in ACCESS for comparison. For this it was necessary to show for the U. S. libraries:

- Titles not held
- Titles held completely
- Titles represented by partial holdings

The status of ACCESS entries with or without holdings information for 325 U.S. libraries (see Appendix 18 for a list of these libraries) is given in Table 4.

The titles of the 1230 serials and 409 conference proceedings not held by U.S. ACCESS participants are attached as Appendixes 19 and 20. While 15,131 of the serials were represented in the combined collections of the 325 U.S. libraries, these data taken alone could be misleading. Further analysis was done of the serial titles listed in ACCESS to determine the extent of the libraries' holdings. This analysis showed that collectively the U.S. libraries held complete files for 10,810 (66.1%) of the serials and partial sets for 4321 (26.4%). There were 1230, or 7.5%, serials which were not held by the libraries.

TABLE 4*

U.S. LIBRARY HOLDINGS OF SERIALS AND CONFERENCE PROCEEDINGS VOLUMES IMPORTANT TO CHEMISTRY AND CHEMICAL ENGINEERING

Type of Publication	Number of Titles		
	Total	With Holdings	Without Holdings
1. Serials	16,361	15,131	1,230
2. Conference Proceedings Volumes	2,773	2,364	409

Table 5 shows a breakdown of these figures into USOE regions and states. The national total for complete files is 66.1%, yet no single region holds more than 45.3% (Region 2). In reviewing the individual states, Illinois had the highest number of complete files with 38.8% of the serials listed in ACCESS.

A similar analysis of holdings of conference proceedings by USOE Region and by state was conducted and the results are summarized in Table 6. For this study, there was no partial holdings listing, since the libraries either owned the volumes or they did not.

There were 2773 conference proceedings volumes titles in the ACCESS file. Nationally, 2364 of them were held, and 409 were not. Region 2 held 72.2%, and Region 8 held 44.8% of the total on file. New York State held the most titles, while Idaho did not report any holdings of the conference proceedings volumes.

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* If the holdings of foreign libraries were included, the availability of the serials is increased by 558 and the conference proceedings volumes by 337.

TABLE 5

U. S. LIBRARY HOLDINGS OF 16,361 SERIALS IMPORTANT TO CHEMISTRY AND CHEMICAL ENGINEERING SHOWN BY USOE REGION AND BY STATE

USOE Regions and States	Complete Holdings		Partial Holdings		No Holdings	
	Number	Percent*	Number	Percent*	Number	Percent*
Region 1						
Connecticut	1,323	8.0	3,462	21.2	11,576	70.8
Maine	791	4.8	2,612	16.0	12,958	79.3
Massachusetts	2,558	15.7	4,321	26.4	9,482	58.0
New Hampshire	1,757	10.7	3,391	20.7	11,213	68.6
Rhode Island	1,619	9.9	2,363	14.5	12,379	75.7
Vermont	843	5.2	2,101	12.9	13,417	82.1
REGIONAL TOTAL	3,794	23.2	4,646	28.4	7,921	48.5
Region 2						
Delaware	1,378	8.4	4,281	26.2	10,702	65.5
New Jersey	2,202	13.5	2,351	14.4	11,808	72.2
New York	5,616	34.4	5,475	33.5	5,270	32.2
Pennsylvania	5,014	30.7	4,746	29.0	6,601	40.4
REGIONAL TOTAL	7,411	45.3	4,459	27.3	4,491	27.5
Region 3						
Puerto Rico	742	4.5	6,761	41.4	8,858	54.2
District of Columbia	3,368	20.6	8,156	49.9	4,837	29.6
Kentucky	2,347	14.4	5,120	31.3	8,894	54.4
Maryland	1,590	9.7	2,680	16.4	12,091	74.0
North Carolina	3,002	18.4	3,107	19.0	10,252	62.7
Virginia	2,200	13.5	3,939	24.1	10,222	62.5
West Virginia	851	5.2	2,683	16.4	12,827	78.4
REGIONAL TOTAL	3,961	24.2	8,728	53.4	3,672	22.5

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* Percents do not always total exactly 100.0 owing to rounding error.

TABLE 5 (contd.)

U. S. LIBRARY HOLDINGS OF 16,361 SERIALS
IMPORTANT TO CHEMISTRY AND CHEMICAL ENGINEERING
SHOWN BY USOE REGION AND BY STATE

USOE Regions and States	Complete Holdings		Partial Holdings		No Holdings	
	Number	Percent*	Number	Percent*	Number	Percent*
Region 4						
Alabama	1,972	12.1	5,948	36.4	8,441	51.6
Florida	2,308	14.1	3,498	2.14	10,555	64.6
Georgia	2,620	16.0	3,199	19.6	10,542	64.5
Mississippi	653	4.0	2,802	16.1	12,906	79.0
South Carolina	891	5.5	1,847	11.3	13,623	83.3
Tennessee	1,625	9.9	1,877	11.5	12,859	78.7
REGIONAL TOTAL	3,530	21.6	3,996	24.4	8,835	54.1
Region 5						
Illinois	6,335	38.8	5,439	33.3	4,587	28.1
Indiana	3,514	21.5	5,933	36.3	6,914	42.3
Michigan	3,890	23.8	3,452	21.1	9,019	55.2
Ohio	4,242	26.0	3,847	23.5	8,272	50.6
Wisconsin	3,647	22.3	3,365	20.6	9,349	57.2
REGIONAL TOTAL	6,960	42.6	5,841	35.7	3,560	21.8
Region 6						
Iowa	4,402	26.9	5,867	35.9	6,092	37.3
Kansas	3,051	18.7	3,256	19.9	10,054	61.5
Minnesota	3,940	24.1	3,105	19.0	9,316	57.0
Missouri	4,214	25.9	4,168	25.5	7,979	48.8
Nebraska	2,366	14.5	4,040	24.7	9,955	60.9
North Dakota	830	5.1	2,427	14.8	13,104	80.2
South Dakota	880	5.4	1,443	8.8	14,038	85.9
REGIONAL TOTAL	4,404	26.9	5,716	35.0	6,241	38.2

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*Percents do not always total exactly 100.0 owing to rounding error.

TABLE 5 (contd.)

U. S. LIBRARY HOLDINGS OF 16,361 SERIALS IMPORTANT TO CHEMISTRY AND CHEMICAL ENGINEERING SHOWN BY USOE REGION AND BY STATE

USOE Regions and States	Complete Holdings		Partial Holdings		No Holdings	
	Number	Percent*	Number	Percent*	Number	Percent*
Region 7						
Arkansas	1,452	8.9	5,300	32.4	9,609	58.8
Louisiana	2,040	12.5	3,059	18.7	11,262	68.9
New Mexico	1,140	7.0	2,840	17.4	12,381	75.7
Oklahoma	1,276	7.8	2,142	13.1	12,943	79.2
Texas	2,847	17.4	3,855	23.6	9,659	59.1
REGIONAL TOTAL	4,832	29.6	2,866	17.5	8,663	53.0
Region 8						
Colorado	2,895	17.7	3,661	22.4	9,805	60.0
Idaho	987	6.0	2,804	17.2	12,570	76.9
Montana	992	6.1	1,693	10.4	13,676	83.7
Utah	1,616	9.9	2,334	14.3	12,411	75.9
Wyoming	972	5.9	2,289	14.0	13,100	80.1
REGIONAL TOTAL	2,571	15.7	3,279	20.1	10,511	64.3
Region 9						
Alaska	340	2.1	3,724	22.8	12,297	75.2
Arizona	883	5.4	2,225	13.6	13,253	81.1
California	4,562	27.9	6,161	37.7	5,638	34.5
Hawaii	1,492	9.1	6,140	37.6	8,729	53.4
Nevada	470	2.9	2,239	13.7	13,652	83.5
Oregon	1,664	10.2	3,025	18.5	11,672	71.4
Washington	3,321	20.3	3,412	20.9	9,628	58.9
REGIONAL TOTAL	6,339	38.8	4,861	29.7	5,161	31.6
NATIONAL TOTAL	10,810	66.1	4,321	26.4	1,230	7.5

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* Percents do not always total exactly 100.0 owing to rounding error.

TABLE 6

U. S. LIBRARY HOLDINGS OF 2773 CONFERENCE PROCEEDINGS VOLUMES IMPORTANT TO CHEMISTRY AND CHEMICAL ENGINEERING

USOE Regions and States	Total of Complete or Partial Holdings		No Holdings	
	Number	Percent*	Number	Percent*
Region 1				
Connecticut	800	28.8	1,973	71.2
Maine	290	10.5	2,483	89.5
Massachusetts	1,118	40.3	1,655	59.7
New Hampshire	693	25.0	2,080	75.0
Rhode Island	383	13.8	2,390	86.2
Vermont	483	17.4	2,290	82.6
REGIONAL TOTAL	1,335	48.1	1,438	51.9
Region 2				
Delaware	814	29.4	1,959	70.6
New Jersey	1,021	36.8	1,752	63.2
New York	1,919	69.2	854	30.8
Pennsylvania	1,404	50.6	1,369	49.4
REGIONAL TOTAL	2,002	72.2	771	27.8
Region 3				
Puerto Rico	180	6.5	2,593	93.5
District of Columbia	731	26.4	2,042	73.6
Kentucky	885	31.9	1,888	68.1
Maryland	813	29.3	1,860	70.7
North Carolina	1,247	45.0	1,526	55.0
Virginia	932	33.6	1,841	66.4
West Virginia	285	10.3	2,486	89.7
REGIONAL TOTAL	1,561	56.3	1,212	43.7

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* Percentages do not always total exactly 100.0 owing to rounding error.

TABLE 6 (contd.)

USOE Regions and States	Total of Complete or Partial Holdings		No Holdings	
	Number	Percent *	Number	Percent *
Region 4				
Alabama	1,050	37.9	1,723	62.1
Florida	913	32.9	1,860	67.1
Georgia	1,202	43.3	1,571	56.7
Mississippi	343	12.4	2,430	87.6
South Carolina	463	16.7	2,310	83.3
Tennessee	409	14.7	2,364	85.3
REGIONAL TOTAL	1,504	54.2	1,269	45.8
Region 5				
Illinois	1,467	52.9	1,306	47.1
Indiana	1,271	45.8	1,502	54.2
Michigan	1,224	44.1	1,549	55.9
Ohio	1,500	54.1	1,273	45.9
Wisconsin	1,318	47.5	1,455	52.5
REGIONAL TOTAL	1,894	68.3	879	31.7
Region 6				
Iowa	929	33.5	1,844	66.5
Kansas	1,100	39.7	1,673	60.3
Minnesota	1,306	47.1	1,467	52.9
Missouri	1,678	60.5	1,095	39.5
Nebraska	866	31.2	1,907	68.8
North Dakota	484	17.5	2,289	82.5
South Dakota	369	13.3	2,404	86.7
REGIONAL TOTAL	1,861	67.1	912	32.9
Region 7				
Arkansas	316	11.4	2,457	88.6
Louisiana	727	26.2	2,046	73.8
New Mexico	442	15.9	2,331	84.1
Oklahoma	61	2.2	2,712	97.8
Texas	1,225	44.2	1,548	55.8
REGIONAL TOTAL	1,363	48.8	1,420	51.2

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* Percentages do not always total exactly 100.0 owing to rounding error.

TABLE 6 (contd.)

USOE Regions and States	Total of Complete or Partial Holdings		No Holdings	
	Number	Percent*	Number	Percent*
Region 8				
Colorado	1,043	37.6	1,730	62.4
Idaho	0	0.0	2,773	100.0
Montana	339	12.2	2,434	87.8
Utah	911	32.9	1,862	67.1
Wyoming	21	0.8	2,752	99.2
REGIONAL TOTAL	1,241	44.8	1,532	55.2
Region 9				
Alaska	201	7.2	2,572	92.8
Arizona	1,011	36.5	1,762	63.5
California	1,901	68.6	872	31.4
Hawaii	685	24.7	2,088	75.3
Nevada	333	12.0	2,440	88.0
Oregon	1,093	39.4	1,680	60.6
Washington	1,234	44.5	1,539	55.5
REGIONAL TOTAL	1,990	71.8	783	28.2
NATIONAL TOTAL	2,364	85.3	409	14.7

Collectively, the 325 U.S. libraries that contributed holdings data to ACCESS partially held 26.4% of the 16,361, or 4321, serial titles (Table 5). The holdings data for these 4321 titles were examined in order to determine the seriousness of the gaps in the collective file. Essentially, the investigators wanted to know whether the gaps represented serials published in earlier or in more recent years. The year 1956 was established as the dividing point, because use studies (20)(21)(22) had shown less demand for issues published prior to 1957 than for those published after that time. It was therefore contended that the unavailability of these older issues would not present as serious a statistical problem as would gaps in years since 1956.

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* Percentages do not always total exactly 100.0 owing to rounding error.

This analysis of partial holdings showed that although there were 4321 serial titles in ACCESS for which only partial holdings are listed, collectively 2238 or 51.8% of the titles were held completely since 1956. Another 462 or 10.7% of the titles had actually ceased publication prior to 1956, while for 1621 or 37.5% of the total titles, the gaps appeared in the years 1956 to date.

The programs used for making this analysis took into consideration the fact that some of the titles also ceased publication after 1956. This did not affect the results, however, because the gaps were determined by comparing the beginning and the ending years of publication against the beginning and ending years of each library's files.

The Applicability File described earlier in this report identified 4150 serials considered to be of prime importance to one or more scientific or technical subject areas. These have come to be known in the information science community as "core" serials. Several studies(23) (24) have pointed out that a very high percentage of the significant original contributions appear in less than 10% of the total population of serials. For chemistry and chemical engineering, for example, CAS has determined that some 850 titles of the 12,000 monitored yield 75% of the abstracted papers.

It therefore seemed appropriate to review the availability from U.S. libraries of these core serials that were identified during generation of the Applicability File.

The ACCESS file was found to contain entries for 3197 of the 4150 core serials identified in the Applicability File, of which 1106 were considered to be core serials for the chemical sciences, and 2091 were considered to be core serials for other scientific and technical disciplines or subject areas.

This review showed the availability of core serials to be significantly greater than that for the overall list of serials contained in ACCESS. Collectively, the 325 U.S. libraries had complete holdings for 80.0% of the core titles and partial holdings for 19.0% of them.

The status of the core journal holdings by USOE Region and state is indicated in Table 7. A comparison of the status of national holdings of the full range of ACCESS serial titles versus that of the core serials is presented in Table 8.

TABLE 7

U.S. LIBRARY HOLDINGS OF 3197 SCIENTIFIC AND TECHNICAL "CORE" SERIALS BY USOE REGION AND STATE

USOE Regions and States	Percent Held in Complete Sets	Percent Held in Partial Sets	Percent Not Held
Region 1			
Connecticut	8.0%	51.5%	40.3%
Maine	11.2	40.8	47.7
Massachusetts	24.1	53.4	22.3
New Hampshire	26.4	43.9	29.4
Rhode Island	20.9	30.0	48.8
Vermont	14.4	31.4	54.0
REGIONAL TOTAL	37.4	45.9	16.4
Region 2			
Delaware	20.8	55.3	23.6
New Jersey	26.1	27.2	46.5
New York	48.9	41.4	9.4
Pennsylvania	56.8	36.9	6.1
REGIONAL TOTAL	68.7	26.7	4.3
Region 3			
Puerto Rico	15.4	73.6	10.8
District of Columbia	20.2	60.1	19.4
Kentucky	31.7	46.6	21.4
Maryland	22.3	33.9	43.5
North Carolina	35.0	32.9	31.9
Virginia	32.9	39.3	27.6
West Virginia	0.0	47.6	52.1
REGIONAL TOTAL	17.9	73.3	8.6
Region 4			
Alabama	31.3	53.4	15.0
Florida	34.6	38.0	27.1
Georgia	35.7	33.8	30.3
Mississippi	9.8	43.5	46.5
South Carolina	12.4	27.9	59.4
Tennessee	25.5	24.2	50.0
REGIONAL TOTAL	41.7	38.6	19.4

TABLE 7 (contd.)

USOE Regions and States	Percent Held in Complete Sets	Percent Held in Partial Sets	Percent Not Held
Region 5			
Illinois	61.3%	32.9%	5.5%
Indiana	42.6	47.6	9.5
Michigan	47.5	32.7	19.6
Ohio	48.3	36.5	14.9
Wisconsin	41.3	33.9	24.6
REGIONAL TOTAL	58.9	37.6	3.3
Region 6			
Iowa	45.3	47.5	7.0
Kansas	38.1	32.8	28.9
Minnesota	45.6	28.8	25.3
Missouri	46.8	38.4	14.5
Nebraska	33.0	41.9	24.8
North Dakota	11.8	34.3	53.6
South Dakota	12.7	19.8	67.2
REGIONAL TOTAL	35.8	52.9	11.0
Region 7			
Arkansas	23.7	57.2	18.9
Louisiana	26.4	35.2	38.1
New Mexico	18.7	38.5	42.5
Oklahoma	17.1	30.8	51.8
Texas	31.8	41.7	26.3
REGIONAL TOTAL	53.0	25.7	21.1
Region 8			
Colorado	37.8	37.8	24.2
Idaho	13.1	39.3	47.4
Montana	12.0	22.4	65.3
Utah	21.2	30.3	48.2
Wyoming	14.0	33.9	51.8
REGIONAL TOTAL	26.9	37.2	35.6

TABLE 7 (contd.)

USOE Regions and States	Percent Held in Complete Sets	Percent Held in Partial Sets	Percent not Held
Region 9			
Alaska	5.6%	52.1%	42.0%
Arizona	12.3	28.5	58.9
California	38.6	52.0	9.1
Hawaii	21.2	64.0	14.5
Nevada	8.1	30.3	61.3
Oregon	18.7	38.5	42.6
Washington	40.1	33.5	26.2
REGIONAL TOTAL	59.7	32.4	7.6
NATIONAL TOTAL	80.0	19.0	1.0

TABLE 8

COMPARISON OF NATIONAL HOLDINGS FOR ALL SERIALS VERSUS CORE SERIALS LISTED IN ACCESS

	Complete	Partial	None
ACCESS Serials	66.1%	26.4%	7.5%
Core Serials	80.0%	19.0%	.1.0%

Interlibrary Loan Characteristics and Effectiveness

This section of the report presents the findings based upon analysis of the Interlibrary Loan File and is divided into three parts:

> Part A contains general information on the sample. The size of the sample is reviewed and the number of requests generated and received by each of the USOE Regions is examined. The traffic flow between each of the USOE Regions is shown.
>
> Part B presents the analysis of the characteristics of the scientific and technical serials and conference proceedings volumes identified in the sample of 70,686 requests that the contract staff collected.
>
> Part C reports how variations in these characteristics and variations in the level and precision of information on request forms affect the speed with which requests are handled by recipient libraries.

Part A. General Information on the Interlibrary Loan File Sample

Data used to generate the findings present in the following three parts of this section were initially obtained from a sample of 70,686 interlibrary loan and facsimile (photocopy or microfilm) requests collected by the contract staff from 19 resource libraries distributed throughout the nine U.S. Office of Education (USOE) Regions. The number of requests collected in each USOE Region is given in Table 9.

The table shows that the sample was collected in two parts. The first, referred to in this report as the "characteristic" sample, contained 62,634 requests which represented approximately 10% of the requests either generated or received by each of the surveyed libraries during a 12-month period. For most of the libraries this was the calendar year 1967, but for a few it was the fiscal year 1967 (July 1966-June 1967). This sample was designed to provide data on the characteristics of the serials and non-serials represented in the overall interlibrary loan and facsimile request traffic.

The second sample, or "performance" sample, contained 8052 requests which were received by the libraries during an eight-week period between January and March 1968. These requests had supplemental data added to each by the contracting libraries so that intralibrary performance characteristics could be judged.

TABLE 9

REGIONAL DISTRIBUTION OF THE 70,686
INTERLIBRARY LOAN REQUESTS

USOE	Characteristics Sample		Performance Sample		Total	
Region	Number	Percent	Number	Percent	Number	Percent
1	11,946	19.1	848	10.5	12,794	18.1
2	14,702	23.5	1,485	18.5	16,187	22.9
3	1,036	1.6	802	10.0	1,838	2.6
4	1,689	2.7	644	8.0	2,333	3.3
5	6,762	10.8	801	9.9	7,563	10.7
6	9,439	15.1	952	11.8	10,391	14.7
7	3,720	5.9	945	11.7	4,665	6.6
8	3,765	6.0	830	10.3	4,595	6.5
9	9,575	15.3	745	9.3	10,320	14.6
TOTALS	62,634	100.0	8,052	100.0	70,686	100.0

Of the 70,686 requests, 68,634 were generated by libraries in the United States and 2052 by foreign libraries. Table 10 shows this interlibrary loan traffic between regions for the 68,634 U.S. Requests. Each intersection of the table shows the number of requests generated in the region listed at the left of the table and sent to the region listed at the top of the table. The last two vertical columns list the total number and percent of requests generated in each region. The lowest row of the table gives the total number of requests received by any region. Clearly, most requests are intraregional; these account for 46,238 (67.4%) of the total 68,634 requests. Interregional requests accounted for the remaining one-third of the total (22,306 requests).

TABLE 10

TRAFFIC FLOW FOR 68,634 U.S. INTERLIBRARY LOAN AND FACSIMILE REQUESTS IN AND BETWEEN USOE REGIONS

		Regions to Which Requests Were Sent										
		Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8	Reg. 9	Total Requests	Percent of Total
Regions In Which Requests Were Generated	**Reg. 1**	10,638	1,940	97	11	174	246	13	4	20	13,143	19.1
	Reg. 2	436	8,860	299	11	1,464	1,068	52	7	32	12,229	17.8
	Reg. 3	178	865	1,146	84	186	268	17	12	24	2,780	4.1
	Reg. 4	63	264	858	1,998	60	354	196	29	82	3,904	5.7
	Reg. 5	105	1,308	85	15	3,797	1,453	53	41	125	6,982	10.2
	Reg. 6	43	301	238	13	1,135	5,008	98	117	73	7,027	10.2
	Reg. 7	33	229	140	76	75	530	3,674	407	98	5,262	7.7
	Reg. 8	20	68	339	16	98	823	195	4,048	577	6,184	9.0
	Reg. 9	78	650	221	25	362	831	130	256	8,570	11,123	16.2
	TOTAL REQUEST	11,594	14,485	3,423	2,249	7,351	10,581	4,428	4,922	9,601	68,634	100
	PERCENT OF TOTAL	16.9	21.1	5.0	3.3	10.7	15.4	6.5	7.2	14.0		

Part B. Interlibrary Loan File Characteristics Analysis

All records in the Interlibrary Loan File were reviewed to obtain data relevant to the following characteristics:

Document Characteristics

- Number of different serials and conference proceedings volumes
- Publication year (age) of the requested publications
- Languages in which the publications were printed
- Number of pages or length of the requested item

Request Characteristics

- Medium used to transmit the request
- Transmittal time for mailed request
- Fulfillment media
- Reasons for non-fulfillment
- Citation validity
- Number of times an item was re-requested.

Document Characteristics

The Interlibrary Loan File was analyzed to obtain data common to all records which would identify the title of each publication requested and give its age, language and page length. The results of this analysis are given in the four sub-sections that follow.

The purpose of this study was to identify which serials and conference proceedings volumes had actually been requested and to present as an appendix to the overall study a listing of those titles that appeared most frequently in the sample interlibrary loan and facsimile requests collected for the contract.

In the total sample of 70,686 requests, titles of 11,370 different serials* and 912 conference proceedings volumes were represented. The sample was divided into increments of approximately 5% and the number of publication titles in each increment was determined. Table 11 shows the results of this division.

From the data presented in Table 11 a distribution curve was developed showing the cumulative number of publications plotted against the cumulative percentage of requests. This curve (Figure 4) indicates that 25% of the 70,686 requests were for papers that had been published in 195 different serials; 50% of the 70,686 were for papers in 850 serials; 75% were for papers in 2595 serials and 67 conference proceedings volumes; while 11,370 serials and 912 conference proceedings volumes accounted for 100% of the records in the Interlibrary Loan File.

A list of titles of the 850 serials that contained 50% of the requested papers is given as Appendix 21. This Appendix also includes: (a) the number of times each serial was requested, (b) the number of these requests that were filled or unfilled, (c) whether or not ACCESS contains an entry for the serial, and (d) the relationship of these 850 serials to the list of core serials for biology, chemistry, medicine, metallurgy, nuclear science, and physics.

A list of the 6838 serials and conference proceedings titles that had appeared in the Interlibrary Loan File two or more times was compared to the entries in ACCESS. This comparison identified 875 titles not in ACCESS. However, these 875 titles represented only 1750 interlibrary loan requests. A list of serials and conference proceedings volumes requested eight or more times for which no entry appears in ACCESS is presented as Appendix 22.

Age of Requested Publications

For 67,357 of the total 70,686 interlibrary loan requests, it was possible to determine the year in which the requested item was published. A distribution by year of publication of these 67,357 requests is presented in Table 12.

These data when plotted into a graph (Figure 5) illustrate the general distribution pattern previously recognized by other researchers (26)(27)(28).

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* Of these, three serials were requested more than 300 times each -- Nature, Comptes Rendus Hebdomadaires des Seances de l'Academie de Sciences, Paris, and the Journal of the American Chemical Society.

TABLE 11

DISTRIBUTION BY FREQUENCY OF REQUEST OF TITLES REQUIRED TO PRODUCE 70,686 INTERLIBRARY LOAN REQUESTS

Titles		Requests			
Number	Cumulative Number	Number	Cumulative Number	Percent	Cumulative Percent
14	14	3,616	3,616	5.1	5.1
25	39	3,586	7,202	5.1	10.2
36	75	3,378	10,580	4.8	15.0
54	129	3,688	14,268	5.2	20.2
66	195	3,509	17,777	4.9	25.1
89	284	3,716	21,493	5.3	30.4
98	382	3,372	24,865	4.8	35.2
142	524	4,006	28,871	5.6	40.8
131	655	3,046	31,916	4.4	45.2
195	850	3,754	35.671	5.3	50.5
204	1,054	3,259	38,830	4.6	55.1
296	1,350	3,824	42,754	5.4	60.5
283	1,633	2,965	45,719	4.2	64.7
379	2,012	3,184	48,903	4.5	69.2
650	2,662	4,199	53,102	5.9	75.1
472	3,134	2,360	55,462	3.4	78.5
1,672	4,806	5,694	61,156	8.0	86.5
2,032	6,838	4,064	65,220	5.8	92.3
5,444	12,282	5,466	70,686	7.7	100.0

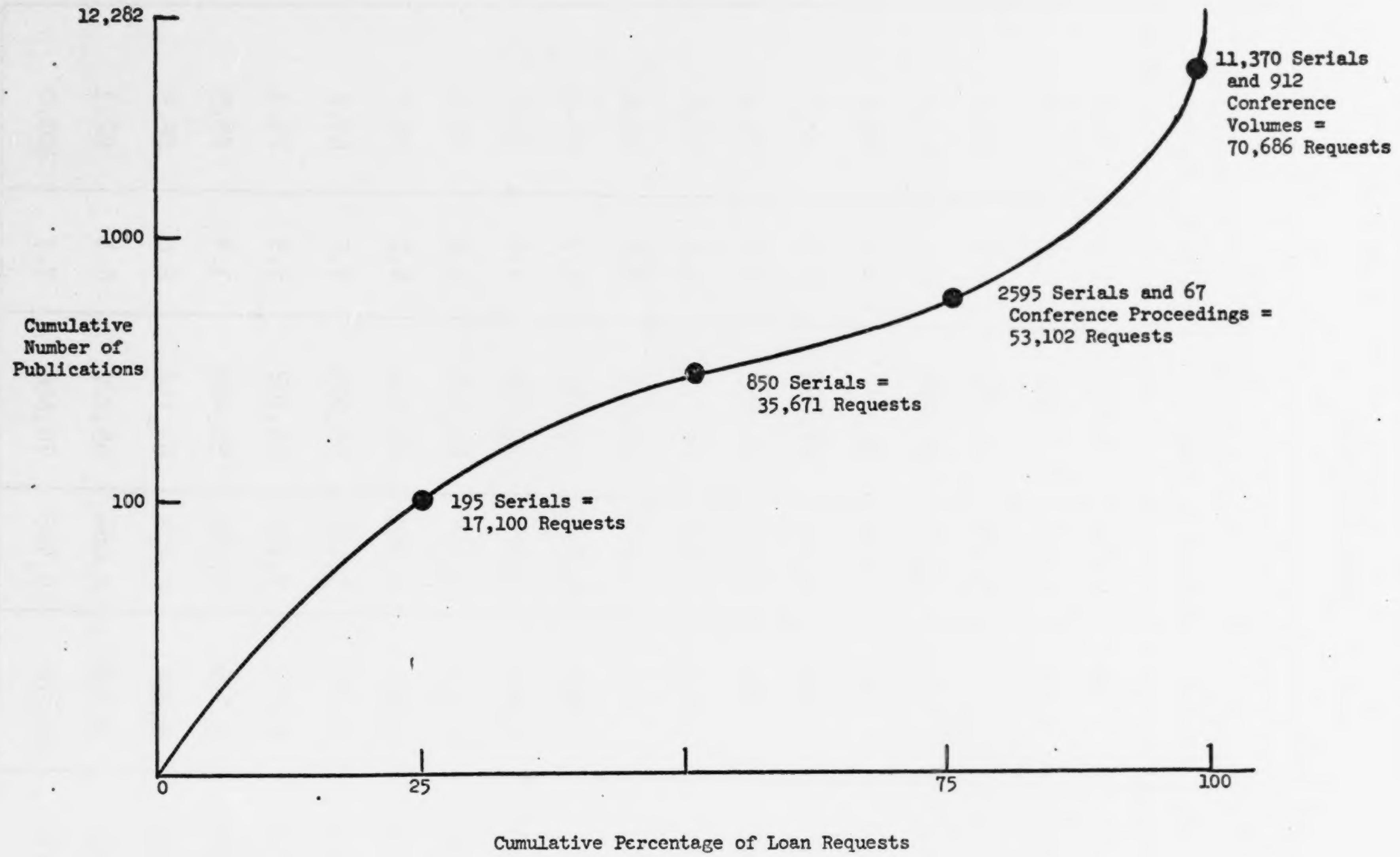

Figure 4

FREQUENCY OF LOAN REQUESTS
VERSUS
NUMBER OF DIFFERENT SOURCE PUBLICATIONS

TABLE 12

AGE DISTRIBUTION OF 67,357 PUBLICATIONS REQUIRED ON INTERLIBRARY LOAN

Year	Number of Requests	Percent of Total	Cumulative Percent	Percent of Total by Range of Years
1968	226	.3	.3	30.6
1967	4,354	6.5	6.8	
1966	9,336	13.8	20.6	
1965	6,742	10.0	30.6	
1964	4,894	7.3	37.9	25.8
1963	3,817	5.7	43.6	
1962	3,087	4.6	48.2	
1961	2,816	4.2	52.4	
1960	2,665	4.0	56.4	
1955-1959	9,238	13.6	70.0	13.6
1950-1954	6,059	9.0	79.0	9.0
1945-1949	3,084	4.6	83.6	4.6
1940-1944	2,077	3.1	86.7	3.1
1935-1939	2,328	3.5	90.2	3.5
1930-1934	1,503	2.2	92.4	2.2
1925-1929	989	1.5	93.9	7.6
1920-1924	656	1.0	94.9	
1900-1919	1,784	2.6	97.5	
-1899	1,702	2.5	100.0	
TOTAL	67,357	100.0		

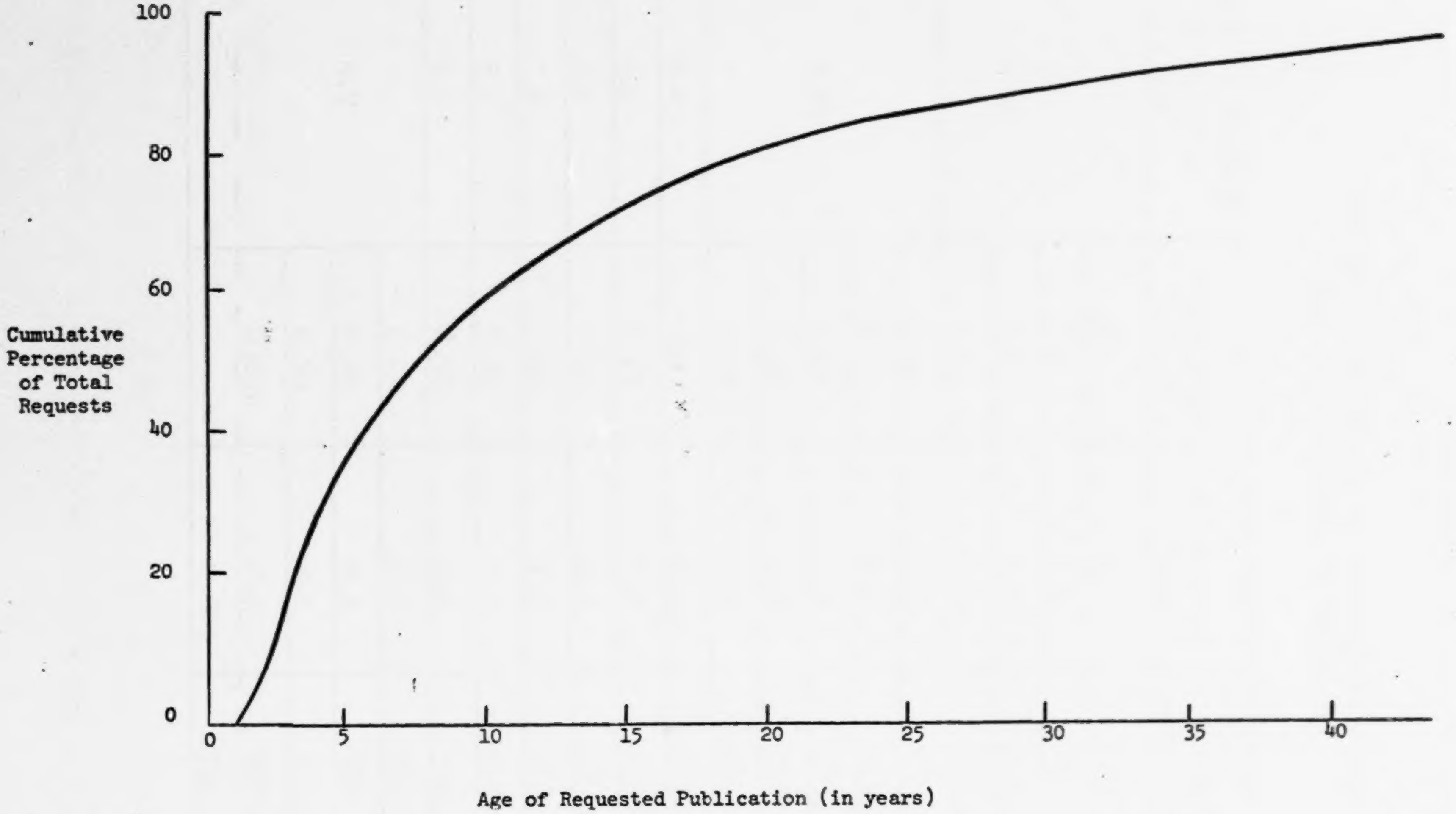

Figure 5

FREQUENCY OF 67,357 INTERLIBRARY LOAN REQUESTS
VERSUS
AGE OF THE REQUESTED PUBLICATIONS

One of the questions the analysis was designed to answer was whether there were any marked variations or differences in the age of publications requested by users in one region of the country as compared with those requested in another region. To obtain an answer, the requests were sorted by USOE Region of the requesting library. These data, expressed in percentages of the total requests generated in each region and compared to the national percentages, are given in Table 13.

Language of the Requested Publications

The languages of the requested items were reviewed for all 70,686 request forms. Publications printed in English accounted for 80.8% of the total, while publications in German, French, Russian and Italian constituted another 16.3% of the total. No other language accounted for as much as 1.0% of the total. The distribution of the requests by language, given in ranked order, is presented in Table 14.

The requests collected from each of the 19 source libraries were also reviewed to determine whether the distribution pattern by language tended to vary from library to library. The results of the analysis of languages of the publications are presented in Table 15.

A further analysis was made to determine the relationship between the language and the age of requested publications. In the total of 70,686 interlibrary loan requests, 67,357 indicated both language and age. Table 16 presents the distribution by age of the requests published in the ten most frequently encountered languages. These are expressed as a percent of the total number of requests for publications in a particular language.

TABLE 13

AGE DISTRIBUTION OF 67,357 PUBLICATIONS REQUESTED ON INTERLIBRARY LOAN BY USOE REGION COMPARED TO NATIONAL SAMPLE

Range of Years	National	USOE Region in Which Request Originated								
		1	2	3	4	5	6	7	8	9
1965-1968	30.6%	33.6%	36.8%	29.5%	23.5%	37.7%	31.9%	26.3%	25.7%	23.5%
1960-1964	25.8	25.6	25.6	26.5	24.9	24.3	25.4	26.0	26.8	24.8
1955-1959	13.6	14.1	13.7	13.0	14.4	12.1	14.5	12.8	13.1	14.2
1950-1954	9.0	9.5	8.5	9.7	10.2	8.3	8.4	9.2	9.6	8.5
1945-1949	4.6	4.4	4.4	4.6	5.1	4.5	4.0	5.3	4.6	4.8
1940-1944	3.1	3.0	2.6	3.0	3.2	2.5	3.0	3.3	3.6	3.7
1935-1939	3.5	3.3	2.3	2.9	3.9	3.1	3.4	4.1	4.3	4.1
1930-1934	2.2	2.0	1.4	1.6	2.8	1.6	2.3	3.0	2.9	3.1
-1929	7.6	4.5	3.8	8.4	12.0	5.9	7.1	10.0	9.4	13.3

TABLE 14

LANGUAGES OF PUBLICATION FOR 70,686 INTERLIBRARY LOAN REQUESTS

Language	Number of Requests	Percent of Total
English	57,114	80.8
German	5,514	7.8
French	2,891	4.1
Russian	2,323	3.3
Italian	773	1.1
Japanese	631	.9
Spanish	419	.6
Polish	191	.3
Czech	165	.2
Dutch	120	.2
Swedish	104	.2
Hungarian	72	.1
Romanian	70	.1
Danish	69	.1
Chinese	56	.1
Norwegian	50	.1
Portugese	48	.1
Other*	86	.1
TOTAL	70,686	100.0

* Other languages included:

Bulgarian	15 Requests	Turkish	2 Requests
Slovak	11	Azerbaijani	1
Finnish	9	Georgian	1
Ukrainian	8	Indonesian	1
Serbo-Croation	4	Unknown	34

TABLE 15

LANGUAGE DISTRIBUTION PATTERNS EXPRESSED AS PERCENTS OF THE TOTAL REQUESTS RECEIVED BY EACH OF THE 19 RESOURCE LIBRARIES

Language	Total Sample	Resource Library																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
English	80.8%	89.6%	86.8%	71.7%	93.1%	79.4%	72.6%	78.9%	81.2%	79.6%	80.9%	73.8%	81.1%	64.9%	83.6%	78.7%	85.0%	74.4%	78.6%	73.1%
German	7.8	4.6	6.0	8.5	3.3	8.7	10.9	9.4	8.2	8.6	8.2	9.0	6.9	12.0	7.9	9.3	7.9	10.1	8.6	10.1
French	4.1	2.7	3.3	6.4	1.3	3.9	7.3	5.8	3.5	5.2	3.2	5.6	3.2	7.0	4.0	4.7	3.3	6.7	3.3	6.4
Russian	3.3	.9	2.7	5.1	1.4	4.0	3.5	3.2	2.7	4.5	3.1	3.6	4.6	6.5	2.2	2.1	1.7	4.0	4.9	4.4
Italian	1.1	.8	.3	1.7	.3	1.1	1.9	.4	1.1	.1	.9	2.5	1.3	3.2	1.0	1.1	.9	1.0	.7	1.8
Japanese	.9	.1	.2	1.3	.2	1.4	.2	1.1	.1	.3	1.6	2.9	1.3	1.3	.6	1.5	.4	.5	1.6	1.3
Spanish	.6	.5	*	1.5	.1	.2	1.1	---	1.1	.4	.6	1.2	.2	1.7	.1	1.5	.3	2.4	.5	.9
Polish	.3	.2	.1	1.0	.1	.4	.2	.2	.3	.3	.3	.3	.3	.4	.2	.2	.1	.2	.3	.3
Czech	.2	.1	.2	1.2	.1	.5	.1	---	.3	---	.4	---	.3	.2	.1	.1	.1	.1	.2	.3
Dutch	.2	.1	*	.3	*		.5	.2	.4	---	.1	.1	.2	.4	.1	.2	.1	---	.2	.4
Other	.7	.5	.3	1.4	.1	.5	1.8	.9	1.2	1.1	.8	1.1	.7	2.4	.3	.6	.2	.7	1.0	1.2

* Less than .05

TABLE 16

RELATIONSHIP BETWEEN LANGUAGE AND YEAR OF PUBLICATION FOR DOCUMENTS COMPRISING 67,357 INTERLIBRARY LOAN REQUESTS

Language	1965-1968	1960-1964	1955-1959	1950-1954	1945-1949	1940-1944	1935-1939	1930-1934	To 1929
English	31.4%	26.6%	14.2%	9.2%	4.9%	3.1%	3.2%	1.9%	5.5%
German	22.8	17.6	10.5	7.3	2.0	4.0	6.1	5.5	24.2
French	23.1	18.0	10.0	9.7	4.8	2.7	6.3	3.7	21.7
Russian	36.6	24.7	12.2	10.6	5.5	3.3	3.4	1.0	2.7
Italian	23.7	28.8	13.3	7.0	4.2	2.6	2.8	3.6	14.0
Japanese	35.1	27.3	16.6	9.7	2.9	3.2	1.6	2.2	1.4
Spanish	15.4	21.8	18.2	8.5	6.9	6.4	3.3	3.3	16.2
Polish	43.7	28.6	9.6	2.8	2.3	---	2.8	5.1	5.1
Czech	36.5	31.1	22.2	8.4	1.8	---	---	---	---
Swedish	8.9	24.7	14.9	5.0	8.9	2.0	8.9	5.0	21.7

Length of Requested Publications

In the 70,686 sample requests contained in the Interlibrary Loan File there were 57,156 requests for which the number of pages of the requested publications was known. A breakdown of the requests by length is given in Table 17.

TABLE 17

DISTRIBUTION BY NUMBER OF PAGES FOR DOCUMENTS COMPRISING 57,156 INTERLIBRARY LOAN REQUESTS

Number of Pages	Total	Percent of Total
1-5	19,399	33.9
6-10	17,483	30.6
11-25	13,693	23.9
26-50	3,290	5.8
50+	3,291	5.8
TOTAL	57,156	100.0

The 8052 requests in the performance sample were also divided by length of publication, first, by region and, second, by source libraries. Table 18 presents data for the regional breakdown as compared to the national total; Table 19 shows the data for the source libraries. The performance sample breakdown was done in order to study whether or not the length distribution varied markedly from the national total, and to ascertain whether libraries could predetermine the number of pages of reproduction work they might be called upon to provide during a given period and whether they could estimate the volume of requests.

TABLE 18

LENGTH DISTRIBUTION BY USOE REGION FOR PUBLICATIONS COMPRISING 8052 INTERLIBRARY LOAN REQUESTS

USOE Region Generating Request	Number of Pages				
	1-5	6-10	11-25	26-50	50+
Region 1	33.2%	32.5%	26.2%	5.6%	2.5%
Region 2	39.5	32.5	20.9	4.0	3.1
Region 3	19.5	23.7	27.1	10.9	18.8
Region 4	30.3	27.4	23.8	6.3	12.2
Region 5	39.7	33.2	19.8	3.6	3.7
Region 6	32.7	28.7	23.8	6.5	8.3
Region 7	32.0	27.5	27.7	8.2	4.6
Region 8	31.7	31.6	24.6	5.6	.5
Region 9	28.6	27.6	26.3	7.8	9.7
National	33.9%	30.6%	23.9%	5.8%	5.8%

TABLE 19

LENGTH DISTRIBUTION BY LIBRARY FOR PUBLICATIONS COMPRISING 8052 INTERLIBRARY LOAN REQUESTS

Source Library Receiving Request	Number of Pages				
	1-5	6-10	11-25	26-50	50+
Library 1	32.6%	33.1%	26.8%	5.1%	2.4%
Library 2	33.6	32.1	25.9	5.9	2.5
Library 3	23.5	20.5	25.5	11.2	19.3
Library 4	36.8	36.3	22.1	3.3	1.5
Library 5	45.1	29.8	18.8	3.7	2.6
Library 6	19.9	22.0	26.8	10.2	21.1
Library 7	18.8	28.1	28.1	12.5	12.5
Library 8	31.7	28.1	24.3	5.9	10.0
Library 9	26.0	24.7	22.1	7.5	19.7
Library 10	41.2	33.6	18.8	3.4	3.0
Library 11	30.4	30.9	25.5	4.7	8.5
Library 12	39.8	31.0	21.9	4.5	2.8
Library 13	27.5	27.1	25.1	8.0	12.3
Library 14	32.8	27.5	26.9	8.3	4.5
Library 15	31.4	27.5	28.2	8.2	4.7
Library 16	32.5	31.5	25.0	5.4	5.6
Library 17	28.7	31.9	23.4	6.3	9.7
Library 18	27.5	28.5	25.2	7.7	11.1
Library 19	29.4	26.9	27.2	7.8	8.7
National	33.9%	30.6%	23.9%	5.8%	5.8%

Request Characteristics

The records on the Interlibrary Loan File were examined to determine the relationships of request characteristics that affect the availability of documents to users. The request characteristics are interrelated with and yet distinguishable from the characteristics of the requested documents, and include:

- Transmittal media
- Transmittal time for mailed requests
- Fulfillment media
- Reasons for nonfulfillment
- Validity of citations on requests
- Repeat requests

Transmittal Media

For 67,222 of the 70,686 request forms the contract staff was able to determine the medium used to transmit the request from the borrowing to the lending institution. An analysis of these data is given in Table 20.

TABLE 20

MEDIA BY WHICH 67,222 INTERLIBRARY LOAN REQUESTS WERE TRANSMITTED

Form	Number of Requests	Percent of Total
ALA Interlibrary Request Form	28,650	42.5
Lending Libraries' Custom Form	26,356	39.2
Letter	4,575	6.8
Telephone	3,599	5.4
Courier	2,596	3.9
TWX	1,446	2.2
Total	67,222	100.0

The 67,222 requests divided by transmittal medium were subdivided by the USOE Region where the request was generated. This was done in order to be able to analyze any regional differences in practice of transmitting interlibrary loan and facsimile requests. The results of this analysis are presented in Table 21 using the national total for comparison.

TABLE 21

TRANSMITTAL MEDIA FOR 67,222 INTERLIBRARY LOAN REQUESTS EXPRESSED AS PERCENTAGES OF THE TOTAL REQUESTS GENERATED BY EACH REGION

USOE Region	ALA Form	Custom Form*	Letter	Telephone	Courier	TWX
1	28.7%	51.3%	12.1%	7.3%	.4%	.2%
2	14.0	66.5	8.7	9.1	.7	1.0
3	62.7	29.3	6.4	.9	**	.7
4	59.6	9.7	5.0	5.2	.7	19.8
5	34.2	43.1	10.1	12.2	.2	.2
6	44.4	17.7	4.9	.3	31.9	.8
7	37.0	45.1	4.6	7.3	2.2	3.8
8	81.0	13.3	3.4	1.2	1.0	.1
9	67.9	28.6	1.0	.2	.1	2.2
National Total	42.5	39.2	6.8	5.4	3.9	2.2

---

* Most generally a special request form provided by the lending institution.

** Less than .05%

Transmittal Time for Mailed Requests

For 37,417 of the 59,581 requests transmitted by mail (ALA forms, Custom Forms, and letter requests) it was possible to identify two dates: the date the requesting institution placed on the request (supposedly the date the request was mailed) and the date the recipient library had either written or stamped on the request (presumably the date of receipt). Although the requests received by any one of the 19 libraries could have been received from libraries in any of the other eight USOE Regions, and in fact were (see Table 10), an analysis of the lapse of time between the two dates revealed that in-transit time ranged from the same day, i.e., mailed and received the same day, for 4.7% of the requests, to over 31 days for .4% of the requests. For 93.8% of the requests, the mail transit time was seven days or less. Results of this analysis are shown in Table 22.

Table 23 shows the variations in transmittal time for mailed requests received by each of the 19 resource libraries by the USOE Regions in which the recipient libraries are located and compares these with the national total.

Fulfillment Media

Each of the 70,686 requests was reviewed to ascertain whether or not it had been filled, and if so, what medium was used to fill the request. From the 59,484 filled requests, a total of 54,254 carried an indication of the fulfillment media. Only three media were noted: lending of the original, the use of some form of direct photographic or electrostatic reproduction, or the use of microfilm. Table 24 presents data showing the numbers and percentages of the total for each of these three media.

TABLE 22

TRANSMITTAL TIME FROM BORROWING TO LENDING INSTITUTION OF 37,417 MAILED INTERLIBRARY LOAN REQUESTS

Number of Days	Requests		
	Number	Percent of Total	Cumulative Percent
1	1,759	4.7	4.7
2	10,739	28.7	33.4
3	7,633	20.4	53.8
4	6,024	16.1	69.9
5	5,014	13.4	83.3
6	2,582	6.9	90.2
7	1,347	3.6	93.8
8-10	1,197	3.2	97.0
11-13	374	1.0	98.0
14-16	262	.7	98.7
17-19	112	.3	99.0
20-22	112	.3	99.3
23-25	37	.1	99.4
26-28	37	.1	99.5
29-31	37	.1	99.6
Over 31	150	.4	100.0
Totals	37,417	100.0	

TABLE 23

TRANSMITTAL TIMES FOR 67,222 MAILED INTERLIBRARY LOAN REQUESTS EXPRESSED AS A PERCENTAGE OF THE TOTAL EACH USOE REGION RECEIVED

Number of Days	National	USOE Region								
		1	2	3	4	5	6	7	8	9
1	4.7%	8.8%	3.1%	2.0%	2.2%	2.4%	1.0%	15.7%	7.2%	3.8%
2	28.7	20.4	35.0	28.4	24.2	33.2	12.5	23.9	28.5	39.4
3	20.4	22.5	22.7	22.4	24.1	24.2	14.2	18.6	13.5	14.2
4	16.1	14.6	16.2	16.5	17.8	14.6	25.7	19.2	13.9	13.9
5	13.4	16.0	11.6	11.6	13.2	9.5	22.9	10.4	14.8	10.4
6	6.9	7.8	4.6	8.7	5.2	5.7	11.6	5.6	8.1	7.2
7	3.6	3.6	2.3	4.8	3.1	3.7	5.6	2.4	3.5	4.6
8-10	3.2	3.5	1.7	2.4	2.7	4.4	3.7	2.0	5.5	3.6
11-13	1.0	.8	.9	.9	4.4	.8	1.1	.4	1.5	1.1
14-16	.7	.7	.7	.6	1.6	.8	.5	.6	1.3	.8
17-19	.3	.2	.3	.3	.7	*	.3	—	.9	.1
20-22	.3	.5	.4	.5	.1	.1	.1	—	.3	.1
23-25	.1	.1	.1	.1	—	.1	.1	.4	.1	.1
26-28	.1	*	.1	.2	.3	*	*	—	.5	—
29-31	.1	*	.1	.2	.1	*	.1	—	—	.1
Over 31	.4	.4	.5	.4	.4	.4	.5	.9	.5	.4

* Less than .05%.

TABLE 24

MEDIA USED TO FILL 54,254
INTERLIBRARY LOAN REQUESTS

Media	Requests	
	Number	Percent of Total
Original	6,358	11.7
Photocopy	46,535	85.8
Microfilm	1,361	2.5
Total	54,254	100.0

The fulfillment media used at each of the 19 resource libraries were studied to establish variations and to see how each compared to the national statistics. The data given in Table 25 are expressed in percentages of the total number of filled requests for which media could be identified.

For 50,027 of the sample requests that were filled, it was possible to identify both the fulfillment media and the publication year of the requested item. An analysis was made of these data in order to determine the variations in the use of a given medium to fill requests for newer versus older publications. The results are shown in Table 26.

TABLE 25

FULFILLMENT MEDIA FOR 54,254 INTERLIBRARY LOAN REQUESTS EXPRESSED AS A PERCENTAGE OF THE TOTAL EACH OF THE 19 RESOURCE LIBRARIES PROCESSED

Library Code	Photocopy	Original	Microfilm
1	99.0%	.3%	.7%
2	95.9	.5	3.6
3	54.4	45.0	.6
4	95.0	---	5.0
5	96.3	---	3.7
6	62.8	37.2	---
7	38.2	61.8	---
8	91.6	8.4	---
9	56.3	43.4	.3
10	89.3	9.7	1.0
11	74.4	25.6	---
12	54.5	37.5	8.0
13	80.7	16.7	2.6
14	97.7	2.3	---
15	98.1	1.7	.2
16	86.1	13.5	.4
17	74.6	25.2	.2
18	84.7	15.2	.1
19	77.6	22.3	.1
National	85.8	11.7	2.5

TABLE 26

RELATIONSHIP BETWEEN AGE AND FULFILLMENT MEDIA FOR 50,027 INTERLIBRARY LOAN REQUESTS

Publication Year Ranges	Total Requests	Total Percent	Photocopy		Original		Microfilm	
			Number	Percent	Number	Percent	Number	Percent
1965-1968	14,986	29.9	13,338	30.8	1,268	22.7	380	30.2
1960-1964	12,912	25.8	11,263	26.1	1,316	23.6	333	26.5
1955-1959	7,087	14.2	6,134	14.2	801	14.4	152	12.1
1950-1954	4,708	9.4	4,027	9.3	571	10.2	110	8.8
1945-1949	2,453	4.9	2,099	4.9	295	5.3	59	4.7
1940-1944	1,559	3.1	1,335	3.1	193	3.5	31	2.5
1935-1939	1,766	3.6	1,455	3.4	261	4.7	50	4.0
1930-1934	1,145	2.3	909	2.1	203	3.6	33	2.6
-1929	3,411	6.8	2,634	6.1	669	12.0	108	8.6
TOTAL	50,027	100.0	43,194	100.0	5,577	100.0	1,256	100.0

Reason for Non-Fulfillment

There were 11,202 unfilled requests included in the 70,686 loan requests input to the Interlibrary Loan File. From the sample requests it was possible to determine the reasons for non-fulfillment for 9175 of these 11,202 unfilled requests.

These reasons, when given by the libraries receiving the requests, generally fell into three categories:

- Owned, but unavailable -- was in cataloging, at bindery, in use, held for reserve use, in poor condition, copyrighted, or did not circulate.
- Not owned -- was never in library's collection or once had been, but was now lost or withdrawn.
- Unable to identify what was being requested.

The unfilled requests were divided into these categories and then further subdivided when more specific reasons for non-fulfillment were given. Table 27 presents the results of this analysis.

4751 of the requests were sent to libraries that never owned the needed publication. The senders were correct in placing 3416 of these requests, since the libraries were supposed to own the publications and the senders had no way of knowing of the unavailability of the publications. There were 1008 requests that were not filled due to inaccurate citations and, because of the inaccuracies, there was no way of determining whether the libraries could have filled any or all of these requests.

A second analysis was made on these unfilled requests to determine the relationship between the age of the requested publication and the reason for non-fulfillment. Table 28 presents the distribution of the 11,202 unfilled requests by age of publication while Table 29 shows the correlation between the two factors.

TABLE 27

REASONS FOR NON-FULFILLMENT FOR 9175 UNFILLED INTERLIBRARY LOAN REQUESTS

Reason	Requests	
	Number	Percent
In cataloging	9	.1
At bindery	936	10.2
In use	450	4.9
On reserve	28	.3
Does not circulate	367	4.0
In poor condition	64	.7
Copyrighted	73	.8
Other	486	5.3
Sub-total	2413	26.3
Not Owned		
Never owned	4642	50.6
Once owned, now lost	670	7.3
Copy not yet received	496	5.4
Sub-total	5808	63.3
Unable to Identify		
Invalid citation	954	10.4
TOTAL	9175	100.0

TABLE 28

DISTRIBUTION OF 11,202 UNFILLED INTERLIBRARY LOAN REQUESTS BY AGE OF PUBLICATION

Age Range	Number of Requests	Percent of Total
1965-1968	4,522	40.4
1960-1964	2,606	23.3
1955-1959	1,286	11.5
1950-1954	852	7.6
1945-1949	392	3.5
1940-1944	323	2.9
1935-1939	304	2.7
1930-1934	192	1.7
-1929	725	6.4
TOTAL	11,202	100.0

TABLE 29

RELATIONSHIP BETWEEN AGE OF THE REQUESTED PUBLICATION AND REASON OF NON-FULFILLMENT FOR 9175 INTERLIBRARY LOAN REQUESTS

Reason	Percent for Total Sample	Year Ranges								
		1965-1968	1960-1964	1955-1959	1950-1954	1945-1949	1940-1944	1935-1939	1930-1934	-1929
Owned but not available										
In cataloging	.1	.1	.1	---	---	---	---	---	---	---
At bindery	10.2	22.2	3.1	1.2	1.1	.3	3.2	1.3	2.0	1.4
In use	4.9	4.0	5.9	4.9	5.8	3.3	8.8	7.2	4.7	4.6
On reserve	.3	.2	.4	.4	.2	.3	---	---	---	.4
Does not circulate	4.0	2.8	5.6	5.8	2.3	4.6	4.4	3.8	6.0	3.4
In poor condition	.7	.1	.3	.4	.5	1.3	---	.9	1.3	7.0
Copyrighted	.8	.9	.4	1.6	1.2	---	---	---	---	---
Other	5.3	3.4	5.5	7.4	6.5	6.9	4.0	6.8	12.8	8.8
Sub-total	26.3	33.7	21.3	21.7	17.6	16.7	20.4	20.0	26.8	25.6
Not Owned										
Never owned	50.6	40.6	57.4	58.2	62.8	60.6	59.2	57.1	52.5	49.8
Once owned, now lost	7.3	5.9	7.2	8.7	5.8	10.2	12.0	11.9	6.0	10.0
Copy not yet received	5.4	12.0	1.7	.7	.5	.3	.4	.4	1.3	.2
Sub-total	63.3	58.5	66.3	67.6	69.1	71.1	71.6	69.4	59.8	60.0
Unable to identify										
Invalid citation	10.4	7.8	12.4	10.7	13.3	12.2	8.0	10.6	13.4	14.4

The final analysis performed on these unfilled requests was directed at determining what, if any, variations existed in the reasons for non-fulfillment given to requesters by the 19 source libraries that received the requests. Table 30 shows these variations by percentages of the total non-filled requests collected from each library as compared with the national total.

Citation Validity

Of the 70,686 interlibrary loan requests examined, 3254 were found to have invalid citations. Of these 3254, the date of publication of the requested item could be determined on 2995. Table 31 presents a distribution of the 2995 by date and compares the results with the age distribution of 67,357 requests in the total sample (Table 12).

In the performance sample of 8052 interlibrary requests, 1517 were found to have faulty citations while the remaining 6535 requests had valid citations. Table 32 shows the effect of citation validity on request fulfillment. Another sort was then made by source library to determine if any variations occurred from library to library in the number of valid or invalid citations received by each. The results of this analysis are given in Table 33.

Repeat Requests

The Interlibrary Loan File contained records for 1767 requests that were found to be identical to other requests except for the processing dates on the requests and the identification of the libraries to which the requests had been sent. This indicated that the senders had failed to obtain the desired publications or copies on the first attempt and had tried again. A total of 3841 attempts were made to borrow 1767 publications. The number of times this had occurred and for how many publications is shown in Table 34.

There were 56 different serials and conference proceedings volumes which contained 190 papers for which four or more interlibrary loan attempts were made. A list of these 56 publications is given in Appendix 23.

TABLE 30

REASONS FOR NON-FULFILLMENT OF 9175 INTERLIBRARY LOAN REQUESTS EXPRESSED AS A PERCENTAGE OF THE TOTAL EACH OF THE 19 RESOURCE LIBRARIES RECEIVED

Reason	Total	Source Library																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Owned but not available																				
In cataloging	.1	---	.2%	---	---	---	---	---	---	---	---	---	---	.2%	---	---	---	---	1.1%	---
At bindery	10.2	3.1%	15.4	3.4%	14.7%	26.8%	5.5%	7.3%	.9%	7.7%	5.0%	5.9%	3.0%	5.9	10.4%	6.3%	8.7%	23.6%	8.2	2.3%
In use	4.9	1.2	14.5	5.0	.5	.4	6.5	6.3	3.3	---	7.3	2.4	11.8	3.1	4.2	2.3	3.2	---	2.1	1.9
On reserve	.3	---	---	.6	---	---	---	---	---	5.8	.2	---	---	---	---	---	.3	---	2.7	.4
Does not circulate	4.0	4.4	.3	11.5	---	.2	7.4	---	.9	---	1.2	7.1	---	6.7	10.4	9.8	1.1	1.8	1.1	13.9
In poor condition	.7	---	.2	.4	---	4.0	.4	---	.5	---	.6	1.2	.4	---	2.1	.9	.3	1.8	---	.3
Copyrighted	.8	.6	.1	---	.6	.1	---	---	---	---	5.0	---	1.1	1.1	---	---	---	---	---	---
Other	5.3	1.0	1.9	16.9	10.9	2.0	3.8	3.1	2.4	3.8	4.9	2.4	2.6	10.0	2.1	2.6	3.8	---	3.2	8.4
Sub-total	26.3	10.3	32.6	37.8	26.7	33.5	23.6	16.7	8.0	17.3	24.2	19.0	18.9	27.0	29.2	21.9	17.4	27.2	18.4	27.2
Not owned																				
Never owned	50.6	71.3	31.5	40.1	52.5	46.8	64.9	65.6	77.4	75.0	40.1	62.2	41.9	52.1	54.1	66.6	61.7	60.1	57.3	57.8
Once owned, now lost	7.3	5.4	5.0	17.1	3.7	3.7	6.7	3.1	10.8	1.9	15.8	12.9	4.8	8.8	2.1	3.8	3.0	7.3	3.5	6.8
Copy not yet received	5.4	5.5	8.7	1.8	3.6	12.5	1.2	5.2	.5	---	1.2	1.2	17.4	4.4	6.3	1.4	10.3	1.8	8.8	.5
Sub-total	63.3	82.2	45.2	59.0	59.8	63.0	72.8	73.9	88.7	76.9	57.1	76.3	64.1	65.3	62.5	71.8	75.0	69.2	69.6	65.1
Unable to identify																				
Invalid citation	10.4	7.5	22.2	3.2	13.5	3.5	3.6	9.4	3.3	5.8	18.7	4.7	17.0	7.7	8.3	6.3	7.6	3.6	12.0	7.7

TABLE 31

PUBLICATION AGE OF 2995 REQUESTS BEARING INVALID CITATIONS COMPARED TO THE AGE DISTRIBUTION FOR 67,357 REQUESTS IN TOTAL SAMPLE

Age Range	Invalid Citations	Total Sample
1965-1968	36.1%	30.6%
1960-1964	23.7	25.8
1955-1959	13.6	13.6
1950-1954	9.1	9.0
1945-1949	3.7	4.6
1940-1944	3.5	3.1
1935-1939	2.4	3.5
1930-1934	1.7	2.2
-1929	6.2	7.6
TOTAL	100.0	100.0

TABLE 32

NUMBER AND PERCENT OF THE 8052 INTERLIBRARY LOAN REQUESTS IN THE PERFORMANCE SAMPLE SHOWING VALIDITY OF CITATION FOR FILLED AND NON-FILLED REQUESTS

Status of Citation	Filled		Unfilled		Total	
	Number	Percent	Number	Percent	Number	Percent
Valid	6,401	92.6	134	11.7	6,535	81.2
Invalid	508	7.4	1,009	88.3	1,517	18.8
TOTAL	6,909	100.0	1,143	100.0	8,052	100.0

TABLE 33

CITATION VALIDITY OF 8052 REQUESTS RECEIVED
BY EACH OF THE 19 SOURCE LIBRARIES

Library Code	Percent of Total Requests	
	With Invalid Citations	With Valid Citations
1	5.9	94.1
2	6.2	93.8
3	8.9	91.1
4	7.9	92.1
5	4.3	95.7
6	4.2	95.8
7	4.9	95.1
8	2.9	97.1
9	2.1	97.9
10	5.2	94.8
11	1.7	98.3
12	3.1	96.9
13	6.3	93.7
14	2.0	98.0
15	4.0	96.0
16	3.2	96.8
17	2.3	97.8
18	2.5	97.5
19	5.5	94.5
National	5.0	95.0

TABLE 34

REPEATED ATTEMPTS TO OBTAIN 1767 PUBLICATIONS ON INTERLIBRARY LOAN

Number of Attempts	Number of Items
2	1,578
3	129
4	38
5	10
6	5
7	3
8	3
9	1
10	0
11	0
12	1
More than 12	0

Part C. Recipient Library Performance

Data for this phase of the investigation was drawn from records contained in the performance sample in the Interlibrary Loan File. In all, the 19 resource libraries provided records for 8052 interlibrary loan requests for this sample.

The analyses reported were directed at identifying and studying factors that affect the time required by recipient libraries to process requests.

Two sets of characteristics were reviewed, those relevant to the documents being requested and those relevant to the requests.

The document characteristics studied were:

- Age
- Language
- Length

The request characteristics were:

- Transmittal media
- Fulfillment media
- Reason for non-fulfillment
- Prior verification of citation
- Validity of citation
- Multiple item requesting

In addition, this phase of the investigation was directed at obtaining data indicative of the effort expended at each of the 19 resource libraries processing the interlibrary loan requests. In this context, the work "processing" is used to mean request fulfillment as well as notification of non-fulfillment.

The total processing time for a interlibrary loan request consists of many separate time intervals, e.g., transmittal time from borrower to lender and back, processing time in each library, and time required to notify the initial requester of the fulfillment or non-fulfillment of the request.

There were 7109 records of interlibrary loan requests in the performance sample on which the processing time within the library was indicated. An analysis of this information is shown in Table 35.

These 7109 performance sample requests were analyzed to determine the number of days required by the recipient libraries to process the requests. Because each of the 19 resource libraries' contributions to the performance sample varied (see Table 3) all results of these processing time analyses are expressed in percentages to facilitate comparison with other libraries as well as with the national averages.

Table 36 shows the variations between days of internal processing time at the resource libraries. The total contribution to the performance sample for each library is 100.0%.

A similar analysis was made of the performance sample by USOE region to determine whether any correlations existed between the internal processing time and the region of the United States in which the borrowing institution was located. The results of this analysis present data for both filled and unfilled requests by region of origination and are shown in Table 37.

Document Characteristics that Affect Processing Time

Among the factors that may influence the processing time are those that are inherent to the requested document itself. Three of these studied were age, language, and length.

The requests in the performance sample were analyzed on the basis of the age of the requested publication and its relation to the number of days required for processing. The results of this analysis given in Table 38.

The next analysis of the performance sample was directed at providing answers to the question: What effect does the language of a requested publication have on the processing time? Two tables are provided to display these results, Table 39 for filled requests, Table 40 for notification of non-fulfillment.

TABLE 35

PROCESSING TIME DISTRIBUTION FOR PROCESSING 7109 INTERLIBRARY LOAN REQUESTS

Number of Days	Filled Requests			Unfilled Requests			Total Requests		
	Number	Percent	Cumulative Percent	Number	Percent	Cumulative Percent	Number	Percent	Cumulative Percent
1	886	14.2	14.2	154	17.4	17.4	1,040	14.6	14.6
2	1,334	21.4	35.6	154	17.4	34.8	1,488	20.9	35.5
3	894	14.4	50.0	93	10.5	45.3	987	13.9	49.4
4	746	12.0	62.0	72	8.2	53.5	818	11.5	60.9
5	608	9.8	71.8	102	11.5	65.0	710	10.0	70.9
6	464	7.5	79.3	83	9.4	74.4	547	7.7	78.6
7	345	5.5	84.8	33	3.7	78.1	378	5.3	83.9
8-10	531	8.5	93.3	86	9.7	87.8	617	8.7	92.6
11-13	176	2.8	96.1	34	3.9	91.7	210	3.0	95.6
14-16	105	1.7	97.8	42	4.8	96.5	147	2.1	97.7
17-19	56	.9	98.7	11	1.3	97.8	67	.9	98.6
20-22	34	.5	99.2	2	.2	98.0	36	.5	99.1
23-25	22	.4	99.6	6	.7	98.7	28	.4	99.5
26-28	6	.1	99.7	1	.1	98.8	7	.1	99.6
29-31	4	.1	99.8	1	.1	98.9	5	.1	99.7
Over 31	14	.2	100.0	10	1.1	100.0	24	.3	100.0
TOTAL	6,225	100.0		884	100.0		7,109	100.0	

TABLE 36

PROCESSING TIME AT THE 19 RESOURCE LIBRARIES EXPRESSED AS A PERCENT OF THE TOTAL EACH HANDLED

Library Code	Time in Days									
	Same Day	2	3	4	5	6	7	8-19	20-31	Over 31
1	.4%	5.8%	7.6%	7.6%	13.0%	12.2%	10.8%	30.0%	10.0%	2.5%
2	17.3	8.7	7.7	10.0	9.7	12.2	12.9	20.2	.3	1.0
3	4.0	10.4	12.7	8.0	7.7	6.4	6.7	39.1	2.0	3.0
4	---	.7	1.4	4.1	3.4	10.1	16.2	64.1	---	---
5	.5	8.2	23.4	12.0	17.0	15.7	12.2	10.7	.3	---
6	1.2	.3	8.5	12.2	14.6	16.4	20.4	24.6	.9	.9
7	.9	3.5	3.5	8.7	3.5	20.0	8.6	43.4	4.3	3.5
8	1.5	16.7	24.2	7.6	10.6	6.1	10.6	21.2	---	1.5
9	15.2	22.0	23.7	13.6	3.4	3.4	5.1	13.6	---	---
10	7.2	10.6	8.9	4.7	2.5	4.7	13.1	45.7	1.3	1.3
11	3.9	15.4	14.1	10.2	14.1	12.8	12.8	14.1	1.3	1.3
12	---	1.0	---	---	1.9	6.7	26.9	58.7	2.9	1.9
13	4.8	13.7	3.2	5.7	3.2	12.1	12.1	38.8	4.8	1.6
14	13.0	28.9	16.7	14.9	8.2	5.6	5.8	6.9	---	---
15	2.8	6.9	9.7	5.6	2.8	2.8	16.6	50.0	---	2.8
16	3.1	7.4	13.6	4.3	10.5	13.6	9.9	33.0	3.4	1.2
17	26.3	5.3	---	21.1	10.5	5.3	---	31.5	---	---
18	---	6.1	2.6	8.7	7.8	5.6	6.5	51.4	7.4	3.9
19	---	2.8	9.6	6.9	6.4	7.8	9.2	45.8	8.3	3.2
NATIONAL	14.6	20.9	13.9	11.5	10.0	7.7	5.3	14.7	1.1	.3

TABLE 37

NUMBER OF DAYS REQUIRED TO PROCESS 7109 FILLED AND UNFILLED REQUESTS EXPRESSED AS A PERCENT OF THE TOTAL GENERATED BY EACH USOE REGION

	Time in Days									
USOE Region	Same Day	2	3	4	5	6	7	8-19	20-31	Over 31
Filled Requests										
Region 1	15.2%	24.3%	20.1%	11.2%	9.5%	4.4%	3.1%	10.3%	1.8%	.2%
2	5.4	18.5	18.3	14.1	12.9	12.8	8.2	9.2	.5	.1
3	4.9	18.3	17.3	17.1	16.7	9.6	4.4	11.1	.2	.4
4	32.8	17.7	14.4	8.0	8.4	6.4	5.4	6.4	.5	---
5	25.2	22.4	8.5	10.7	10.1	7.7	4.3	10.4	.4	.3
6	11.3	25.7	12.8	8.6	8.6	7.7	4.5	19.9	.9	---
7	11.9	26.4	15.8	12.9	8.4	7.9	5.2	11.2	.3	---
8	10.2	33.6	10.3	8.5	3.3	3.4	4.3	23.6	2.2	.6
9	17.6	11.0	7.8	12.8	8.4	3.8	8.1	28.2	1.7	.6
NATIONAL	14.4	21.8	14.4	11.8	9.7	7.4	5.5	13.8	1.0	.2
Unfilled Requests										
Region 1	13.4	25.0	8.9	10.7	12.5	8.9	4.6	14.2	1.8	---
2	21.2	20.1	15.3	12.2	10.6	13.2	1.1	6.3	---	---
3	6.1	14.8	7.8	7.0	15.7	12.2	5.2	28.6	---	2.6
4	19.5	11.5	8.1	8.1	11.5	4.6	9.2	25.1	1.2	1.2
5	21.6	19.2	9.2	3.9	18.5	10.8	3.9	12.3	.8	---
6	29.2	9.8	9.8	---	9.8	4.9	4.9	31.6	---	---
7	25.0	16.8	12.5	7.1	3.6	10.7	1.8	19.7	1.8	---
8	13.0	14.8	5.6	7.4	5.6	3.7	3.7	46.2	---	---
9	16.7	13.1	7.1	9.5	7.1	8.3	2.4	25.0	4.8	6.0
NATIONAL	17.8	17.4	10.0	8.2	11.6	9.7	3.8	19.5	1.0	1.0

TABLE 38

RELATIONSHIP OF PUBLICATION AGE TO NUMBER OF DAYS REQUIRED TO PROCESS 7109 INTERLIBRARY LOAN REQUESTS EXPRESSED IN PERCENTAGES OF THE TOTAL REQUESTS PROCESSED EACH DAY

		Time in Days								
Age Range	National	Same Day	2	3	4	5	6	7	8-19	20-31	Over 31
1965-1968	35.2	49.5%	38.3%	28.9%	29.3%	38.8%	41.3%	37.1%	33.0%	32.6%	32.6%
1960-1964	23.4	18.1	23.3	22.4	29.3	28.0	21.8	23.2	21.5	33.7	17.3
1955-1959	13.2	11.0	13.6	14.4	11.4	10.7	11.3	12.2	15.2	10.5	17.3
1950-1954	8.3	6.5	5.5	14.1	7.0	8.2	7.1	8.5	8.4	4.2	5.8
1945-1949	4.8	3.9	6.7	5.3	5.4	4.6	5.3	4.6	4.1	3.2	5.8
1940-1944	3.2	3.9	3.3	3.3	3.2	2.4	3.7	3.4	3.1	2.1	3.9
1935-1939	3.2	4.5	3.6	3.8	3.5	1.5	2.4	2.7	3.9	1.1	---
1930-1934	2.2	1.3	1.8	2.8	2.9	1.5	1.6	2.2	2.2	2.1	5.8
-1929	6.5	1.3	3.9	5.0	8.0	4.3	5.5	6.1	8.6	10.5	11.5

TABLE 39

RELATIONSHIP OF PUBLICATION LANGUAGE TO NUMBER OF DAYS REQUIRED TO FILL 6099 INTERLIBRARY LOAN REQUESTS EXPRESSED AS PERCENTAGES OF THE TOTAL REQUESTS FOR EACH LANGUAGE

Language	Time in Days									
	Same Day	2	3	4	5	6	7	8-19	20-31	Over 31
Bulgarian	----	----	----	100.0%	----	----	----	----	----	----
Chinese	25.0%	----	25.0%	50.0	----	----	----	----	----	----
Czech	20.0	10.0%	10.0	40.0	20.0%	----	----	----	----	----
Danish	----	40.0	20.0	----	20.0	----	----	20.0%	----	----
English	15.2	21.9	14.1	11.8	9.3	7.4%	5.7%	13.1	1.1%	.2%
Finnish	----	----	----	100.0	----	----	----	----	----	----
French	11.3	19.1	15.0	12.2	11.4	7.3	5.9	15.9	1.4	.5
German	10.8	20.7	15.9	11.8	13.1	7.4	4.6	15.7	.8	.2
Hungarian	----	16.7	16.7	16.7	16.7	33.2	----	----	----	----
Italian	9.5	22.2	14.3	12.7	17.5	4.8	4.8	14.3	----	----
Japanese	5.7	15.1	20.8	15.1	13.2	11.3	7.6	9.4	1.9	----
Netherlandish	20.0	----	10.0	20.0	10.0	----	10.0	30.0	----	----
Norwegian	----	33.3	----	----	----	----	33.3	33.4	----	----
Polish	----	20.0	20.0	20.0	40.0	----	----	----	----	----
Portuguese	----	25.0	50.0	----	----	----	----	25.0	----	----
Romanian	----	----	11.1	11.1	----	22.2	----	55.6	----	----
Russian	5.6	15.9	16.7	19.1	10.3	11.1	2.4	15.9	2.4	.8
Spanish	13.6	22.7	18.2	9.1	9.1	9.1	4.6	9.1	4.6	----
Swedish	25.0	----	25.0	----	----	25.0	----	----	----	25.0
NATIONAL	14.3	21.4	14.4	12.1	9.5	7.4	5.5	14.1	1.1	.2

TABLE 40

RELATIONSHIP OF PUBLICATION LANGUAGE TO NUMBER OF DAYS REQUIRED TO NOTIFY REQUESTER OF NON-FULFILLMENT FOR 1010 INTERLIBRARY LOAN REQUESTS EXPRESSED AS PERCENTAGES OF THE TOTAL REQUESTS FOR EACH LANGUAGE

Language	Time in Days									
	Same Day	2	3	4	5	6	7	8-19	20-31	Over 31
Chinese	----	----	100.0%	----	----	----	----	----	----	----
Czech	----	----	20.0	----	60.0%	----	----	20.0%	----	----
English	17.8%	16.4%	9.3	7.7%	12.1	10.0%	4.2%	20.0	1.0%	1.5%
French	23.3	28.0	7.0	18.6	4.6	----	4.6	11.6	2.3	----
German	16.1	14.3	19.6	8.9	8.9	17.9	1.8	10.7	1.8	----
Hungarian	----	----	----	----	----	----	----	100.0	----	----
Italian	27.8	16.6	16.6	5.6	5.6	11.1	----	16.7	----	----
Japanese	29.4	23.5	5.9	11.8	5.9	5.8	----	17.7	----	----
Dutch	----	33.3	33.4	----	----	----	----	33.3	----	----
Polish	----	50.0	----	----	----	----	----	50.0	----	----
Portuguese	----	----	----	----	----	----	----	100.0	----	----
Romanian	----	66.7	----	----	----	33.3	----	----	----	----
Russian	11.4	15.8	16.0	6.8	11.3	2.3	4.6	27.3	4.5	----
Spanish	8.3	41.7	16.7	----	25.0	----	----	8.3	----	----
Swedish	----	----	----	----	100.0	----	----	----	----	----
NATIONAL	17.5	17.4	10.4	8.0	11.6	9.4	3.7	19.6	1.2	1.2

An analysis of the relationship between the length in pages of the requested item and the processing time was made for both filled and unfilled requests in the performance sample. The results of this analysis are presented in Table 41.

Request Characteristics that Affect Processing Time

Various request characteristics were studied to determine what effect these had on the time required for the recipient library either to fill the request or notify the requester of non-fulfillment.

The effect of transmittal media on processing time was analyzed for both filled and unfilled requests in the performance sample. Table 42 contains the findings of these analyses.

The 6099 filled requests of the performance sample were screened to determine whether or not the media (original, photocopy, microfilm) used to fill the requests had any bearing on the processing time. The results of this review are presented in Table 43.

Earlier analysis established that there were several reasons why requests were not filled (see pages II.83-II.88). The unfilled requests in the performance sample were divided into categories on the basis of reason for non-fulfillment, then subdivided by days of processing time. The findings of this analysis are presented in Table 44.

The staff members at the 19 resource libraries were asked to indicate on the performance sample requests whether or not the reference or citation had been verified in some bibliographic source document prior to their receipt. In the sample 2595 had no indication of verification. Out of the remaining 5459 requests, 3045 requests had been verified and 2414 had not. To determine the effect of citation verification on internal processing time the analysis shown in Table 45 was made.

In the performance sample there were 6099 filled requests and 1010 unfilled requests. The sample request records in the Interlibrary Loan File each carried an indication of the validity or invalidity of the citation furnished by the borrowing library. The effect on processing time is illustrated by the data in Table 46.

TABLE 41

RELATIONSHIP OF DOCUMENT LENGTH TO NUMBER OF DAYS REQUIRED TO PROCESS 7109 FILLED AND UNFILLED INTERLIBRARY LOAN REQUESTS EXPRESSED IN PERCENTAGES OF THE TOTAL IN EACH LENGTH CATEGORY

	Time in Days									
Length	Same Day	2	3	4	5	6	7	8-19	20-31	Over 31
Filled Requests										
Under 5	13.4%	20.6%	16.1%	12.4%	8.9%	8.5%	5.3%	13.6%	1.0%	.2%
5-10	14.5	20.6	12.8	13.3	9.8	7.5	6.2	14.5	.6	.2
11-25	14.7	19.6	15.7	14.2	8.8	5.7	5.2	14.2	1.6	.3
26-50	9.8	19.6	13.6	15.1	9.4	8.7	6.0	15.9	1.5	.4
Over 50	15.8	24.1	12.0	12.0	9.7	5.3	4.5	14.3	2.3	----
NATIONAL	13.9	20.4	14.6	13.3	9.3	7.4	5.6	14.2	1.1	.2
Unfilled Requests										
Under 5	18.2	17.6	8.8	6.1	14.2	10.8	4.1	16.8	1.4	2.0
5-10	19.3	15.7	13.3	7.2	7.2	9.6	4.2	21.7	1.2	.6
11-25	13.5	17.0	10.7	8.9	9.8	9.8	5.4	23.2	.9	.9
26-50	11.1	11.1	3.8	14.8	3.7	11.1	7.4	33.3	3.7	----
Over 50	10.0	23.3	20.0	13.3	3.3	10.0	6.8	10.0	----	3.3
NATIONAL	16.6	16.8	11.2	7.7	10.1	10.4	4.3	20.5	1.2	1.2

TABLE 42

RELATIONSHIP OF TRANSMITTAL MEDIA TO NUMBER OF DAYS REQUIRED TO PROCESS 7109 REQUESTS EXPRESSED AS A PERCENT OF THE TOTAL IN EACH CATEGORY

Transmittal Form	Time in Days									
	Same Day	2	3	4	5	6	7	8-19	20-31	Over 31
Filled Requests										
Letter	7.8%	13.4%	13.8%	14.8%	9.9%	12.4%	6.7%	20.1%	1.1%	----
TWX	13.6	29.7	17.6	14.1	5.5	6.0	6.5	7.0	----	----
Telephone	18.9	30.1	20.8	9.8	9.4	5.4	2.6	2.5	----	----
ALA Form	15.4	20.5	13.6	12.5	8.9	6.1	4.7	16.5	1.5	.3%
Custom Form	10.1	18.9	13.0	10.9	12.8	11.5	9.1	12.9	.7	.3
Courier	14.0	43.8	7.0	8.8	12.3	5.3	5.3	3.5	----	----
NATIONAL	14.2	21.5	14.4	12.0	9.8	7.4	5.5	13.9	1.1	.2
Unfilled Requests										
Letter	12.9	16.1	9.7	6.5	6.5	25.7	9.7	12.9	----	----
TWX	23.1	32.7	13.5	13.5	3.8	1.9	1.9	7.7	----	1.9
Telephone	50.0	17.3	17.3	3.8	7.8	3.8	----	----	----	----
ALA Form	16.0	15.7	9.5	8.0	10.9	7.5	4.1	25.2	1.7	1.4
Custom Form	11.1	19.8	10.5	8.6	19.1	16.7	3.1	10.5	----	.6
Courier	----	----	100.0	----	----	----	----	----	----	----
NATIONAL	17.5	17.6	10.5	8.1	11.6	9.3	3.7	19.5	1.1	1.1

TABLE 43

RELATIONSHIP OF FULFILLMENT MEDIA TO NUMBER OF DAYS REQUIRED TO FILL 6099 INTERLIBRARY LOAN REQUESTS EXPRESSED IN PERCENTAGES OF THE TOTAL IN EACH MEDIA CATEGORY

Fulfillment Media			Time in Days							
	Same Day	2	3	4	5	6	7	8-19	20-31	Over 31
Photocopy	13.2	21.1	14.6	12.2	10.2	7.6	5.9	13.9	1.1	.2
Original	26.0	25.1	12.0	9.2	6.9	5.7	3.4	10.5	1.0	.2
Microfilm	3.3	17.0	14.3	14.3	6.5	10.5	.7	31.4	2.0	----
NATIONAL	14.2	21.4	14.4	12.0	9.8	7.5	5.5	13.9	1.1	.2

TABLE 44

RELATIONSHIP OF PROCESSING TIME TO REASON FOR NON-FULFILLMENT OF 1143 INTERLIBRARY LOAN REQUESTS EXPRESSED IN PERCENTAGES OF THE TOTAL FOR EACH REASON

	Time in Days									
Reason	Same Day	2	3	4	5	6	7	8-19	20-31	Over 31
Owned but not Available										
At Bindery	12.9%	22.6%	4.8%	16.1%	9.7%	14.5%	1.6%	13.0%	----	4.8%
In Use	15.4	15.4	3.9	----	34.6	11.5	3.9	15.3	----	----
On Reserve	40.0	20.0	----	----	40.0	----	----	----	----	----
Does Not Circulate	23.1	34.6	7.7	11.5	3.8	15.4	----	3.9	----	----
In Poor Condition	----	----	66.7	----	16.7	16.6	----	----	----	----
Copyrighted	----	----	----	33.3	33.4	33.3	----	----	----	----
Other	----	21.7	8.7	17.4	8.7	4.4	----	39.1	----	----
SUBTOTAL	13.2	21.8	8.0	11.9	14.6	12.6	1.3	14.6	----	2.0
Not Owned										
Never Owned	22.7	19.9	9.8	8.9	8.6	7.9	3.6	15.8	1.4%	1.4
Owned but Lost	11.0	17.8	16.4	2.7	16.8	13.7	4.1	15.1	1.4	----
Not Received Yet	15.6	6.2	28.1	6.2	12.5	6.3	6.3	18.8	----	----
SUBTOTAL	20.7	18.7	11.9	7.8	10.1	8.6	3.8	15.9	1.3	1.2
Unable to Identify	12.9	12.9	8.2	7.1	8.2	12.9	2.4	31.8	2.4	1.2
NATIONAL	18.3	18.7	10.7	8.5	10.8	9.9	3.2	17.4	1.2	1.3

TABLE 45

RELATIONSHIP OF CITATION VERIFICATION TO NUMBER OF DAYS REQUIRED TO PROCESS 5459 REQUESTS EXPRESSED AS A PERCENT OF THE TOTAL IN EACH CATEGORY

Was Citation Verified	Time in Days									
	Same Day	2	3	4	5	6	7	8-19	20-31	Over 31
Filled										
Yes	15.9%	20.8%	13.9%	12.5%	8.5%	5.9%	4.4%	16.8%	1.2%	.1%
No	14.6	23.2	13.4	13.1	8.8	6.3	4.8	13.8	1.6	.4
NATIONAL	15.3	21.9	13.7	12.8	8.6	6.1	4.6	15.4	1.4	.2
Unfilled										
Yes	16.2	17.2	9.4	6.9	11.6	5.9	4.7	25.6	1.0	1.5
No	18.5	16.0	10.9	9.2	8.8	10.1	3.4	19.7	2.5	.8
NATIONAL	17.1	16.8	9.9	7.8	10.6	7.5	4.2	23.3	1.6	1.2

TABLE 46

RELATIONSHIP OF CITATION VALIDITY TO NUMBER OF DAYS REQUIRED TO PROCESS 7109 REQUESTS EXPRESSED AS A PERCENT OF THE TOTAL IN EACH CATEGORY

Validity of Citation	Time in Days									
	Same Day	2	3	4	5	6	7	8-19	20-31	Over 31
Filled										
Valid	14.9%	22.0%	14.5%	11.8%	9.5%	7.2%	5.0%	13.8%	1.1%	.2%
Invalid	6.4	15.4	12.7	13.9	13.1	10.0	11.9	15.8	.8	----
NATIONAL	14.2	21.3	14.4	12.0	9.8	7.5	5.5	14.0	1.1	.2
Unfilled										
Valid	12.6	24.4	13.5	8.4	7.6	8.4	.8	21.0	2.5	.8
Invalid	18.1	16.5	10.1	8.1	12.3	9.4	4.2	19.2	.9	1.2
NATIONAL	17.4	17.5	10.5	8.1	11.6	9.3	3.7	19.7	1.1	1.1

Frequently borrowers request more than one item on the same letter or form. At most of the resource libraries processing of these requests is not complete until all of the items are accounted for, either filled or not filled. In the performance sample there were 2506 filled requests and 298 requests for multiple items. Data were also available on how many items there were per request. The relationship between processing time and these multiple requests was studied, and the results are presented in Table 47.

Processing Effort

Ideally, processing effort should be expressed in minutes (or in some instances, hours) expended per request. To gather a statistically valid sample of the total population of request transactions would have required an actual on-the-spot time accounting. An activity of such dimensions was neither within the scope or resources of the contract.

Therefore, in order to provide data indicative of the amount of processing effort required, the staff members at the libraries supplying the sample forms in the performance sample were asked to indicate by code the degree of effort required to process the request. Three codes were used:

"R" for requests that required no special handling and were considered as routine.

"N" for requests that required verification of the reference or some other action that removed it for a brief period of time from the routine processing flow.

"D." for requests that for reasons of incorrect data, special photoduplication problems, etc., were considered difficult to process.

Each of the surveyed libraries had its own system for processing loan and photocopy requests, usually different in some respect from that of any other library. One surveyed library, for example, utilized only clerical staff to process its requests, while at another all requests were handled by the professional staff. Because of this, it was not possible to define the levels of effort any more precisely.

TABLE 47

RELATIONSHIP OF MULTIPLE ITEM REQUESTS TO NUMBER OF DAYS OF PROCESSING TIME FOR 2804 REQUESTS EXPRESSED AS A PERCENTAGE OF TOTAL IN EACH CATEGORY

Number of Items per Request	Time in Days									
	Same Day	2	3	4	5	6	7	8-19	20-31	Over 31
Filled										
2-4	13.1%	23.0%	16.0%	11.6%	11.1%	9.4%	6.2%	8.9%	.5%	.2%
5-8	8.7	17.4	13.8	9.8	7.2	9.8	12.8	20.5	----	----
9-12	----	2.9	----	2.9	11.8	11.8	11.8	55.9	2.9	----
Over 12	----	10.0	10.0	10.0	50.0	10.0	10.0	----	----	----
NATIONAL	12.5	22.2	15.6	11.3	11.0	9.5	6.8	10.4	.5	.2
Unfilled										
2-4	22.0	20.8	12.1	9.0	12.6	12.1	3.1	7.5	----	.8
5-8	10.5	21.0	13.2	5.3	15.8	18.4	----	15.8	----	----
9-12	----	----	----	----	33.3	33.4	33.3	----	----	----
Over 12	----	100.0	----	----	----	----	----	----	----	----
NATIONAL	20.1	21.1	12.1	8.4	13.1	13.1	3.0	8.4	----	.7

These data made possible a review of the entire performance sample on the basis of degree of processing difficulty for:

- Filled and unfilled requests
- Variations in this factor on the basis of USOE region where the request was generated
- Variations by source or recipient library
- Relationships between age of the requested publication and the degree of difficulty to process the request
- Relationship between degree of difficulty and the time required by the library to process the request

It was collectively found by the librarians at the 19 resource libraries that of the performance sample of 8052 requests, 6794 (84.4%) were routine to their interlibrary loan systems, 953 (11.6%) were non-routine, and 305 (3.8%) were difficult to process. The processing effort for the performance sample, divided into filled and unfilled requests, was also examined. Table 48 presents the results of this examination.

TABLE 48

DEGREE OF PROCESSING EFFORT FOR 8052 INTERLIBRARY LOAN REQUESTS

Degree of Processing Effort	Unfilled Requests		Filled Requests		Total Requests	
	No.	Percent	No.	Percent	No.	Percent
Routine	701	61.4	6,093	88.2	6,794	84.4
Non-Routine	311	27.2	642	9.3	953	11.8
Difficult	131	11.4	174	2.5	305	3.8
TOTAL	1,143	100.0	6,909	100.0	8,052	100.0

The degree of processing effort was then analyzed for each of the 19 resource libraries. The results of this analysis are given in Tables 49 and 50 for the filled and unfilled requests, as compared with the national total.

The performance sample was further sorted to determine whether there were any differences between processing requests for older versus newer publications. Table 51 illustrates the relationships detected between the age of requested publications and the degree of processing effort required.

Records in the performance sample that indicated both the degree of difficulty and the number of days required by the recipient library to process the request were studied to identify correlations between these two factors. These results are presented in Table 52 for both filled and unfilled requests.

TABLE 49

DEGREE OF PROCESSING EFFORT FOR 6909 FILLED REQUESTS EXPRESSED AS A PERCENTAGE OF THE TOTAL EACH LIBRARY PROCESSED

Library Code	Routine	Non-Routine	Difficult
1	68.9	30.0%	1.1%
2	92.8	----	7.2
3	87.6	11.1	1.3
4	81.1	18.9	----
5	100.0	----	----
6	99.1	.7	.2
7	81.1	10.3	8.6
8	83.7	15.2	1.1
9	95.7	3.9	.4
10	96.6	2.8	.6
11	99.3	.7	----
12	81.6	13.5	4.9
13	89.0	9.6	1.4
14	95.5	2.9	1.6
15	99.0	1.0	----
16	71.5	18.0	10.5
17	87.8	12.2	----
18	82.6	13.9	3.5
19	87.0	10.6	2.4
NATIONAL	88.2	9.3	2.5

TABLE 50

DEGREE OF PROCESSING EFFORT FOR 1143 UNFILLED REQUESTS EXPRESSED AS A PERCENTAGE OF THE TOTAL EACH LIBRARY PROCESSED

Library Code	Routine	Non-Routine	Difficult
1	23.9%	71.6%	4.5%
2	66.7	6.7	26.7
3	85.9	9.0	5.1
4	14.1	74.1	11.8
5	98.0	2.0	----
6	62.5	37.5	----
7	79.7	1.9	18.4
8	25.9	44.4	29.7
9	75.0	18.8	6.2
10	74.5	19.8	5.7
11	98.4	1.6	----
12	18.2	----	81.8
13	12.5	57.8	29.7
14	78.1	17.1	4.8
15	88.7	11.3	----
16	28.0	60.0	12.0
17	62.5	22.5	15.0
18	20.0	66.7	13.3
19	55.0	30.0	15.0
NATIONAL	61.4	27.2	11.4

TABLE 51

RELATIONSHIP OF AGE TO DEGREE OF PROCESSING EFFORT FOR 8052 REQUESTS EXPRESSED AS A PERCENTAGE OF THE TOTAL IN EACH AGE GROUP

Degree of Processing Effort	National	Age of Publication (Year Published)								
		1968-1965	1964-1960	1959-1955	1954-1950	1949-1945	1944-1940	1939-1935	1934-1930	To 1929
Routine	84.8%	83.8%	84.3%	85.0%	86.8%	85.2%	84.7%	91.1%	85.3%	85.2%
Non-Routine	15.5	12.4	11.7	11.7	10.0	11.0	11.8	8.0	11.0	9.6
Difficult	3.7	3.8	4.0	3.3	3.2	3.8	3.5	.9	3.7	5.2

TABLE 52

RELATIONSHIP OF DEGREE OF PROCESSING EFFORT TO NUMBER OF DAYS REQUIRED TO PROCESS 7109 REQUESTS EXPRESSED AS A PERCENTAGE OF THE TOTAL IN EACH PROCESSING EFFORT CATEGORY

Degree of Processing Effort	Time in Days									
	Same Day	2	3	4	5	6	7	8-19	20-31	Over 31
Filled										
Routine	14.8%	21.2%	14.7%	11.8%	10.1%	7.3%	5.4%	13.7%	.9%	.1%
Non-Routine	11.0	23.0	11.9	11.2	6.6	9.9	8.4	15.9	1.7	.4
Difficult	7.1	20.1	13.0	22.1	7.8	5.2	.7	15.6	5.8	2.6
NATIONAL	14.2	21.3	14.4	12.0	9.8	7.5	5.5	14.0	1.1	.2
Non-Filled										
Routine	20.0	19.7	10.8	8.5	13.2	9.3	3.6	13.8	.2	.9
Non-Routine	14.2	16.5	10.4	8.1	10.4	10.4	3.9	22.7	1.9	1.5
Difficult	11.5	7.4	9.5	5.3	6.3	7.4	4.2	43.1	4.2	1.1
NATIONAL	17.5	17.5	10.5	8.0	11.6	9.4	3.7	19.6	1.1	1.1

The U.S. Library Community's Need for Document Back-up Collections

The CAS Library receives and maintains files of over 10,000 scientific and technical serials and 4000 non-serials that date back to 1956. However, this collection is not accessible to the potential user community.

Two analyses were made to determine if the documents routinely acquired by a secondary information processor such as CAS could serve a useful role as a document back-up collection for libraries serving scientists and engineers.

First, from the analysis of the data base that produced ACCESS, 1230 serials and 409 conference proceedings volumes were identified as not being held by any of the 325 surveyed U.S. libraries (Table 4). When these data were compared against an inventory of the CAS Library collection, the CAS collection was found to contain files since 1956 for 619 of these serials and that it also contains 307 of the 409 conference proceedings volumes.

The second analysis was directed at determining whether or not more document requests could have been filled or filled faster if the libraries receiving these loan requests could have called upon the CAS collection as a resource back-up.

The 70,686 sample interlibrary loan requests recorded in the Interlibrary Loan File include 11,202 unfilled requests. In addition, there were 1047 requests for which the library furnishing the material took over 10 days to fill. Thus a total of 12,249 requests or 17.3% of the examined requests were either not filled at all or required 10 days plus transit time to be filled. These 12,249 requests represented 5713 different serial and conference proceedings publications.

An analysis which compared these unfilled or untimely filled requests to the CAS Library holdings indicated that 4267 or 34.8% of the 12,249 requests could have been filled from the CAS Library collection, while 7982 or 65.2% could not have been filled. It is interesting to note that of these 7982 requests for items not in the CAS collection, 3797 requests were for pre-1956 documents that were once held by CAS but subsequently distributed to a wide range of libraries in the U.S. Of the 12,249 requests, 4156 were for documents outside the scope of the scientific and technical primary source literature of interest to the chemical sciences and, therefore, never acquired by the CAS Library.

This analysis also made possible the determination of the USOE Regions in which these unfilled or untimely filled requests were generated. These data are displayed in Table 53.

TABLE 53

USOE REGIONS WHERE 11,202 UNFILLED AND 1047 UNTIMELY FILLED INTERLIBRARY LOAN REQUESTS WERE GENERATED

USOE Region Of Requester	Unfilled or Untimely Filled Requests	
	Number	Percent of Total
1	2,226	18.2
2	2,357	19.2
3	818	6.7
4	617	5.0
5	1,407	11.5
6	606	5.0
7	566	4.6
8	728	5.9
9	2,924	23.9
TOTAL	12,249	100.0

A list of 55 serials requested 10 or more times that were identified by this phase of the study was compared to the CAS Library inventory. This list is presented as Appendix 24 also shows whether or not the requests could have been filled from the CAS Library collection as well as the presence or absence of an entry for the serial in ACCESS. Of the 55 serials all but one are in the CAS Library.

Relevance of the Results of this Review to Scientific and Technical Disciplines Other Than Chemistry and Chemical Engineering

To be able to project the results of this study to scientific and technical disciplines, other than chemistry and chemical engineering, a unit of measure was required. The unit selected was the primary serial. For example, a given primary serial may be covered by several different abstracting services each providing subject oriented routes of access back to the same original source document. The contract staff hypothesized that by identifying serial overlap between the lists of serials covered by various discipline and mission-oriented secondary services and the serials listed in CAS' ACCESS, it would be possible to gain indications of the degree of relevance of this study to scientific and technical disciplines other than chemistry and chemical engineering. By establishing overlap between lists of serials of more general scientific and technical interest, it would be possible to gauge the applicability of our findings to the full range of scientific and technical serial literature.

To study this overlap, the Applicability File described earlier in this study was designed and developed.

Upon completion, this file, formed from 46 source lists, contained entries for 9960 serial titles of interest to two or more scientific and technical subject areas, 7751 of which were included in the bibliographic records base used to produce ACCESS.

The following data present the findings of a series of analyses made on the Applicability File.

Table 54 shows the comparison of seventeen specialized scientific and technical secondary services coverage lists with the serials listed in ACCESS. The range of overlap was 27.2% to 82.2% with a median of 55.6%. In addition, the lists of serials covered by three general scientific and technical services were compared to the ACCESS content. The results of this analysis is given in Table 55.

TABLE 54

COMPARISON OF THE SERIALS COVERED BY SPECIALIZED ABSTRACTING AND/OR INDEXING SERVICES TO THE CURRENT SERIAL TITLES LISTED IN ACCESS

Abstracting and Indexing Services	Number of Entries On List	Overlap with ACCESS	
		Number	Percentage
Nuclear Science Abstracts (1)*	2,788	2,292	82.2
Biological and Agricultural Index(2)	149	122	81.9
Index Medicus(3)	2,250	1,615	71.8
Meteorological and Geoastrophysical Abstracts(4)	119	79	66.4
Applied Mechanics Review(5)	891	554	62.2
Science Abstracts: Physics Abstracts(6)	1,236	760	61.5
International Aerospace Abstracts(7)	985	604	61.3
Bibliography of North American Geology(8)	554	317	57.2
Bibliography & Index of Geology Exclusive of North America(9)	485	269	55.6
Engineering Index(10)	2,029	1,084	53.4
Iron and Steel Institute(11)	1,142	610	53.4
Biological Abstracts(12)	7,003	3,405	48.6
Geoscience Abstracts(13)	521	239	45.9
Mathematical Reviews(14)	1,048	472	45.0
Review of Metal Literature (15)	1,774	642	36.2
Bibliography of Agriculture (16)	9,087	2,648	29.1
Psychological Abstracts(17)	525	143	27.2

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* These reference numbers are keyed to the descriptions of these lists presented in Appendix 12.

TABLE 55

COMPARISON OF SERIALS COVERED BY GENERALIZED SCIENTIFIC AND TECHNICAL ABSTRACTING AND/OR INDEXING SERVICES TO CURRENT SERIAL TITLES LISTED IN ACCESS

Abstracting and Indexing Services	Number of Entries On List	Overlap with ACCESS	
		Number	Percentage
Applied Science and Technology(18)*	230	165	71.7
British Technology Index(19)	380	177	46.6
PANDEX(20)	1,938	1,455	75.1

Several scientific and technical abstracting and indexing services or disciplines have selected from their total range of serial titles a smaller list that is basic to that particular discipline. Five such lists were compared to a similar list (included in ACCESS) selected by the CAS editorial staff as containing the serials which report the most new chemical and chemical engineering information.

Table 56 shows the number of core serial titles by discipline and the coincidence of these with the core serials for the chemical sciences.

This comparison identified 628 titles common to biology, chemistry, medicine, metallurgy, nuclear science, or physics. Table 57 shows the number of titles applicable to more than one of the subject areas considered.

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* These reference numbers are keyed to the descriptions of these lists presented in Appendix 12.

TABLE 56

COMPARISON OF CORE SERIALS WITH THE CORE SERIALS FOR THE CHEMICAL SCIENCES AS LISTED IN ACCESS

Subject	Number of Core Serials	Overlap with Core for Chemistry in ACCESS	
		Number	Percent
Biology (21)*	502	165	32.8
Medicine(3)	2,250	417	18.5
Metallurgy(22)	93	25	26.8
Nuclear Science(23)	302	167	55.3
Physics(24)	82	82	100.0

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* These reference numbers are keyed to the descriptions of these lists presented in Appendix 12.

TABLE 57

NUMBER OF CORE SERIAL TITLES APPLICABLE TO MORE THAN ONE SUBJECT AREA

Number of Core Serial Titles	Number of Subject Areas
4	5
29	4
165	3
430	2

A list of 628 core serials common to two or more of these subject areas is presented in ranked order in Appendix 25.

The applicability of the results of this study to other scientific and technical disciplines can also be measured by comparing published lists of serials most frequently used in libraries as reported by various independent surveys to the content of ACCESS. The result of this comparison is presented in Table 58. It shows that an average of 79.5% of these frequently-used serial titles were contained in ACCESS. Seven of the 10 studies cited here indicated an 85% or greater correspondence with the ACCESS list.

The results of a final comparison of selected serial lists to the content of ACCESS, presented in Table 59, again illustrates that a high percentage of the serials important to specific other disciplines are represented by serials important to chemistry and chemical engineering.

TABLE 58

COMPARISON OF THE MOST FREQUENTLY REQUESTED
SCIENTIFIC AND TECHNICAL SERIALS IN LIBRARIES
WITH THE CURRENT SERIAL TITLES CONTAINED IN ACCESS

Source of List	Number of Entries on List	Overlap with ACCESS	
		Number	Percent
Fleming/Kilgour Study(25)*	67	65	97.0
Kovacs Study(26)	50	48	96.0
Stangl/Kilgour Study(27)	38	36	94.7
Schilling Study(28)	300	266	88.7
Ash/Bruette Study(29)	393	344	87.5
Kurth Study(30)	300	256	85.3
Bonn Study(31)	100	85	85.0
Smith Study(32)	213	166	77.9
Notheisen Study(33)	310	226	72.9
Hoisington Study(34)	412	243	59.0

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* These reference numbers are keyed to the descriptions of these lists presented in Appendix 12.

TABLE 59

COMPARISON OF SERIALS THAT ARE IMPORTANT
TO OTHER SCIENTIFIC AND TECHNICAL DISCIPLINES WITH
CURRENT SERIAL TITLES CONTAINED IN ACCESS

Source of List	Number of Entries On List	Overlap with ACCESS	
		Number	Percent
Keenan/Brickwedde Study(35)*	150	140	93.3
Lasslo Study(36)	148	132	89.2
Keenan/Atherton Study(37)	405	305	75.3
Fava/Hoshovsky Study (38)	512	358	69.9
Sunthata Study(39)	106	72	67.9
Drug Literature(40)	702	469	66.8

Another measure of the applicability of the results of this review to related disciplines is the relationship between the full range of used scientific and technical serials, as demonstrated by the Interlibrary Loan File, and the serial literature of the chemical sciences, as identified by the presence of serials in the CAS Library collection or listed in ACCESS.

For example, of the 850 most frequently requested serials identified by the analysis of the Interlibrary Loan File, virtually all are held by the CAS Library or listed in ACCESS (see Appendix 24).

Of the 628 serials identified as being included in the core literature of two or more of six disciplines (see Appendix 25), 600 have entries in ACCESS.

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* These reference numbers are keyed to the descriptions of these lists presented in Appendix 12.

In the sample of 70,686 interlibrary loan and facsimile requests collected for the study, a total of 11,202 were found not to have been filled. The bibliographic citations on these 11,202 unfilled requests were compared against the content of ACCESS in order to measure both the relevance of the study results and the effectiveness of ACCESS toward improving document availability by presenting the requesting libraries with recently compiled file location data.

It was found that 11,144 of the 11,202 unfilled requests were for serials and that these represented 5453 different serial titles. For 2824 of these titles, there were entries in ACCESS. The results of this analysis are presented in Table 60.

TABLE 60

COMPARISON OF 11,202 UNFILLED INTERLIBRARY LOAN REQUESTS WITH ACCESS CONTENT

Status of ACCESS Entry	Number of Titles	Number of Requests
Entry Includes Applicable Location Data	2,697	6,650
Entry Excludes Applicable Location Data	127	208
No Entry in ACCESS	2,629	4,286

Only 58 of the 11,202 unfilled requests were for conference proceedings volumes. While ACCESS contained no entries for 39 of these 58 conference proceedings volumes, it did contain entries with U.S. library file locations for the remaining 19.

A list of the serial titles that appeared in 5 or more of the unfilled requests is presented in Appendix 26. All of these have entries in ACCESS.

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GLOSSARY

This glossary defines abbreviations, terms, and words used with special meaning in the text and appendixes of this report.

ACCESS

A catalog of bibliographic data and library holdings information pertinent to the serials, conference proceedings volumes, and other publications which constitute the source literature of the chemical sciences. ACCESS was published by the American Chemical Society in October 1969.

ACS

American Chemical Society.

Applicability File

A file that identifies the serials important to chemistry, to other scientific and technical disciplines, and to science and technology in general. This file contains records for over 27,000 titles with which are associated codes for the different source lists on which that title appears.

CAS

Chemical Abstracts Service.

Characteristics Sample

A collection of interlibrary loan requests collected nationwide in order to determine age, language, titles, and other characteristics of the publications requested via interlibrary loan.

Citation

A reference to a specific bibliographic unit, e.g., an article published in a periodical. Such citations customarily include the title and name of the author(s) of the article, identification of the periodical and information regarding the location of the article within the periodical.

Computer-Based

A process that depends upon computer processing. A computer-based process can be wholly computer executed, a computer-assisted manual operation, or a process in which the results of manual effort are subsequently recorded for computer processing.

Conference Proceedings Volume

A publication that contains copies of papers presented at conferences, congresses, institutes, symposia, or similar meetings.

Core Literature

The literature (usually serials) considered by experts in a scientific discipline to be of special value to that discipline, usually because it contains a high concentration of pertinent papers and contributions. This "core literature" is a subset of the full range of literature that may carry papers of interest to the discipline.

Core Serial

See Core Literature.

Data Base

A Data Base is an organized collection of computer records possessing the following attributes:

It is the basic set of records from which other file organizations are created.

In it, all records are interrelated via some common denominator.

All Data Base records are standardized.

Degree of Processing Effort

An indication of the amount of labor expended to process an interlibrary loan request. Each request in the performance sample was assigned one of three codes: R = routine, N = non-routine, or D = difficult, based upon the recipient libraries' experience in handling the request. "Routine" requests contained adequate document identification data and required no special handling. "Non-routine" requests required minimal attention to identify the requested material or limited special handling. "Difficult" requests required extended research to identify the requested material and/or considerable special treatment or handling to fulfill.

Document

The term "Document" is used with various meanings in the Library and Information Science Communities. Throughout this report, the term refers to serials and conference proceedings volumes pertinent to science and/or technology. The term does not refer to individual papers within serials or conference proceedings volumes, nor does it include books, monographs, or patents.

Interlibrary Loan

A transaction between two libraries in which one library borrows, or attempts to borrow, material from another library.

Interlibrary Loan File

A file in machine-readable form containing records for 70,686 Interlibrary Loan transactions. Each transaction record consists of data relevant to the serial or conference proceedings volume that was requested as well as data pertinent to the borrower, lender, and other specified aspects of the transaction.

See also "characteristics sample" and "performance sample."

Multiple Item Request

An interlibrary loan request for two or more different articles, papers or other publications.

Overlap

See Serial Overlap.

Performance Sample

A collection of interlibrary loan transaction records drawn from each of 19 resource libraries. This sample, which was drawn from current processing at the libraries, was used to study factors that affect the timing of interlibrary loan request processing.

Primary Literature

Publications containing information presented for the first time. Examples are: periodicals, books, government bulletins, patents, dissertations, and manufacturers' technical pamphlets. This study covered only primary serials and conference proceedings volumes.

Processing Effort

The labor associated with filling interlibrary loan requests or notifying requesters of non-fulfillment.

Secondary Information Processor

An organization that produces secondary services.

Secondary Services

Printed publications, microforms, magnetic tape, etc., known information that is arranged and organized according to a plan that provides intellectual access to the primary sources from which the information was derived.

Secondary services are designed either to provide access to (but not replace) primary literature (as, for example, abstracting and indexing services) or to provide a concentration of specialized scope on convenient size of selected material scattered in the primary literature (as, for example, a handbook).

Resource Library

Any one of the 19 U.S. libraries that provided records of interlibrary loan transactions for use by CAS for this review.

Serial Overlap

The presence of a given serial title on two or more lists of serials used to build the Applicability File.

Source Library

See Resource Library.

USOE

United States Office of Education.

USOE Regions

Nine geographic groupings of states designated by the United States Office of Education.

Validity

The accuracy of the data contained in a bibliographic citation on an interlibrary loan request. For a citation to be valid it must contain enough accurate data to enable the recipient to unambiguously identify the publication being requested. Since bibliographic citations are generally redundant in content, one or more of the elements of data may be erroneous yet positive identification is still possible.

Verification

Determination by the requester of the accuracy of the bibliographic citation used on an interlibrary loan request prior to the transmittal of the request to the library from which the publication is being requested.